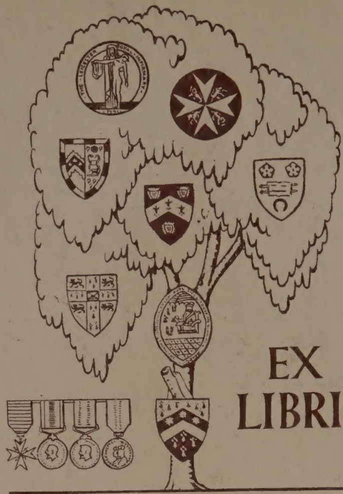

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OF

PRACTICAL MEDICINE:

COMPRISING

GENERAL PATHOLOGY,

THE NATURE AND TREATMENT OF DISEASES,

MORBID STRUCTURES,

AND THE DISORDERS ESPECIALLY INCIDENTAL TO CLIMATES, TO THE SEX,
AND TO THE DIFFERENT EPOCHS OF LIFE;

WITH

Numerous Prescriptions for the Medicines recommended,

A CLASSIFICATION OF DISEASES ACCORDING TO PATHOLOGICAL PRINCIPLES,

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DIGEST OF MEDICAL LITERATURE.

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BY

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IN THREE VOLUMES.

VOL. II.

LONDON:
LONGMAN, BROWN, GREEN, AND LONGMANS,
PATERNOSTER-ROW.
1844.

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A
DICTIONARY
OF
PRACTICAL MEDICINE.

GALL BLADDER AND DUCTS.—Syn. *Biliary Passages; Channels of the Excretion of Bile. La Vesicule et les Canaux du Fiel; Les Voies d'Excretion de la Bile*, Andral. *Die Gallenblasse, Die Gallengang*, Germ.

Classif.—General Pathology—*Morbid Structure:* Special Pathology.

1. The intimate connection, anatomically and physiologically, existing between the liver—the organ secreting the bile, and the digestive canal—the organ for whose functions the bile is chiefly destined, necessarily involves the passages which convey it from the former into the latter, as well as the reservoir of this secretion, in many of the diseases seated in either the one or the other. The affections of the liver, whether functional or structural, are thus often extended to the gall-bladder and ducts; and those of the stomach and duodenum not infrequently proceed in an opposite direction, to the same parts. But the bile itself may excite disease, in the parts through which it passes, and in which it is for a time retained. It will, however, be necessary to take a view of the alterations observed of this secretion, before noticing the effect they sometimes produce in the biliary passages.

I. Of the Alterations of the Bile.

2. The changes of the bile have been found independent of any alteration in the liver, or in the gall-bladder or ducts; and, in most of the lesions of these parts, the bile has been unaltered in appearance, or in quantity, and most probably also in quality. It would seem, therefore, that the most apparent and the most serious lesions of the liver, are not always those which most derange the secreting action of this organ. The conditions which most affect the state of this fluid are such as are either beyond our powers of observation, or seated in the blood. Indeed, there is every reason to suppose that the liver performs, as I many years ago argued in another work, an eliminating function as respects the blood; and that it separates elements from this source, which would be injurious if allowed to accumulate, and elaborates them into a secretion necessary to digestion and assimilation. Alterations in the quality and quantity of the bile, therefore, in a great measure depend upon the blood, and upon the quantity of those constituents which the liver eliminates from this fluid and elaborates into this peculiar secretion.

3. *A.* The only alterations which can be detected in the bile upon simple *inspection*, are differences in *colour* and in *consistence*.—*a.* It presents every shade of *colour*, from a whitish pale straw colour, to the deepest black. The lightest tints have been most frequently observed in cases of anæmia, or chlorosis, or where the blood has been thin, watery, pale, or devoid of red particles—the liver being small, pale, and containing little blood. The dark colour is most common where the blood is thick, dark, or black, and abundant; and when the liver is congested, and the biliary passages loaded with bile.—*b.* The *consistence* of this secretion varies from the fluidity of water, to the thickness of half-melted glue, or of tar, or even of pitch. The deeper its colour, the greater is its consistence; but there are numerous exceptions to this.

4. *B. Chemical analysis* shows that the constituents of the bile vary greatly in their proportions. As the liver approaches more completely to the fatty condition, the more entirely is the bile deprived of its resinous elements. It sometimes, particularly in cases of fatty liver, consists chiefly or almost entirely of water and albumen. In other instances, the yellow matter, the resin, or the cholesterine is the predominant principle. It is this change in the proportions of the component parts of the bile that gives rise to its consistence, as well as to *Biliary* Concretions (see that article).

5. *C. Physiological experiments*, and *various diseases*, evince material alterations in the *qualities* of the bile. This secretion, taken from some dead bodies, produces no other inconvenience, when introduced into a living animal, than a slight local irritation; whilst that taken from others occasions much more serious consequences, and even death itself. In some cases it may be tasted with impunity; in others it produces pustules, ulcers, or vesications on the tongue and lips. It has been observed, in dissections of persons who have died of pestilential yellow fever (see Pestilence), that the bile has excited a painful or burning sensation, followed by excoriation of such parts of the examiner as had come in contact with it. A similar effect is not infrequently produced in the rectum, and around the anus, from the passage of bile which has been long retained and accumulated in the biliary passages. Numerous other proofs of an increased acrimony of this fluid, arising either from the state in which it is secreted, or from changes that have taken place in it during its retention, might be adduced, if they were required.

6. From these considerations it may be inferred—(*a*) that accumulations of this secretion, in either the gall-bladder or ducts, will arise from impaired contractility, or from mechanical obstruction at the outlets, or from the viscid or morbid state of the secretion itself;—(*b*) that the bile itself will some-

times occasion very serious disease in the gall-bladder or ducts, owing to an acrimony acquired by it in the way just stated (§ 2.); — and (*c*) that, when the bile is thus accumulated or retained, as well as altered in quality, the consequent disorder, either in the biliary passages, or in the digestive canal, when it has reached the latter situation, will be the more severe. — The difficulty, however, of forming a correct opinion as to the complaint, when the gall-bladder or ducts are its seats, should not be forgotten; for, owing to the relations noticed above (§ 1.), it often is impossible to distinguish disease of either the one or the other, from that of the liver or duodenum, unless the passage of bile into the intestines is altogether interrupted; and even then the exact nature and extent of lesion are equally difficult of recognition.

II. INACTION OF THE GALL-BLADDER AND DUCTS. — *Accumulation of Bile in the Gall-bladder and Ducts from local Asthenia.*

CLASSIF. — I. CLASS, I. ORDER (*Author*).

7. CHARACT. — *Fulness, weight, or uneasiness in the epigastrium and hypochondrium; flatulence or symptoms of dyspepsia; a pale, slightly lurid, or muddy complexion; scanty or morbid excretion of bile in the stools, frequently with debility and depression of mind.*

8. i. When the functions of the liver, or those of the stomach and duodenum, are impaired, the gall-bladder and ducts necessarily participate in the disorder; and the bile is liable to accumulate in them.—The accumulation may arise from one or more of the following conditions: — 1st. Impaired tonic contractility of the coats of the gall-bladder, and perhaps also of the ducts.— 2d. A congested or tumefied state of the mucous membrane at the outlet of the common duct, and in the duodenum. — 3d. Inspissation of the bile in the gall-bladder and ducts, from the morbid state of the secretion, or from the absorption of its more fluid parts, whilst retained in these situations. — 4th. Spasm of the ducts themselves: — and, 5th. Temporary or constant occlusion of the ducts from inflammation, or from the presence of biliary calculi, either in them or in the gall-bladder.

9. *A*. The *first* of these pathological states is of frequent occurrence, in a moderate degree. When the contractility of the coats of the biliary passages, or of the gall-bladder, is impaired, in connection with torpor of the liver, and debility of the stomach and duodenum, the bile is imperfectly excreted, or it accumulates in these situations. The consequent distension, or the irritating properties the bile acquires by the retention, or some other cause, excites the contractility of these parts, and occasions the collected secretion to be thrown into the duodenum, where it produces more or less disorder, owing to its acridity, and to the very intimate and extensive relations of this intestine with the rest of the œconomy. When the bile has thus accumulated, a very gentle aperient will often be the cause of a violent action on both the stomach and bowels; this secretion, particularly if rendered acrid by long retention, and by the influence of temperature or season, giving rise to all the characters of bilious cholera, when its rapid flow into the duodenum has been thus procured.

10. *B*. That congestion, or a tumefied condition, of the mucous membrane of the duodenum will occasion accumulations of bile in the ducts and gall-bladder, is at least extremely probable; for the aperture of the common duct in this viscus being thereby narrowed, a diminished discharge of bile into it will result, particularly if this secretion be thicker or more viscid than natural. — In cases, therefore, of acute or chronic duodenitis, or of irritation of the internal surface of the duodenum, particularly if there also exist spasm either of this viscus or of the common duct, an impeded or interrupted flow of bile into the digestive canal, with consequent accumulation of it throughout the biliary passages, with or without jaundice, will very generally supervene. (See art. DUODENUM, § 12.)

11. *C*. That the bile becomes inspissated and often more acrid, by retention in any of its passages, may likewise be conceded. The fact is even demonstrated, not only by observation during the life of the patient, but also by the appearances after death. In such cases, it is with some difficulty that the secretion can be forced along the ducts, or from the gall-bladder along the cystic canal. In an inactive state of the liver, the hepatic ducts are unable to discharge the bile which passes into them; and this fluid, during its collection and retention, is liable to be partially absorbed. Owing to this absorption, or to the state of the secretion at the time of its production, or to both, inspissation, viscidity, and increased acrimony of it may take place before it passes out of the liver, or reaches the larger ducts or gall-bladder; and even *concretions* may form in it from the same circumstances, in any of these situations. (See art. CONCRETIONS — *Biliary.*)

12. *D*. Spasm of the common or cystic duct may give rise to retention, and be followed by the same series of changes as have been just mentioned; but the evidence of the occurrence of spasm is much less complete than that of the other pathological states. It seems, however, probable that the passage of an acrid secretion along the cystic and common ducts, will so irritate them as to give rise to spastic constriction of them. This effect is produced upon other canals by irritating matters; and it may therefore be inferred, that a similar result will accrue in this situation from the operation of these agents. That it does occasionally take place, has been demonstrated in some instances by *post mortem* inspections. — That inflammation of the ducts is often followed by accumulation of bile in the gall-bladder and hepatic ducts, will be shown hereafter; it may, however, be stated, that a persistence, or a higher grade, of the same cause — the acridity of the bile — as sometimes occasions spasm or constriction of the ducts, will even induce inflammation of them and its consequences. —It has been often found, upon examination after death, that collections of bile have arisen from tumours, or morbid enlargements of the pancreas, pressing upon, or even obliterating, the ducts, particularly the common duct. Several instances of this kind have occurred to me in practice. That biliary concretions, in the common, the cystic, or the hepatic ducts, often produce similar effects, is a sufficiently established fact in pathology.

13. ii. The *symptoms* of accumulations of bile in

the gall-bladder and ducts from impaired action are — fulness and uneasiness in the epigastrium, extending to the right hypochondrium, sometimes attended by a sense of weight, distension, and of coldness in the pit of the stomach, and by pain or uneasiness about the lower angle of the shoulder blades; flatulency, oppression, or acidity of the stomach; a pale or sallow complexion; a dark circle around the eyes; a loaded, pale, or yellowish tongue; diminished clearness of the skin; a soft, slow, weak, or languid pulse; lassitude or debility; inability of exertion; constipation, colicky pains, or an irregular state of the bowels with deficiency of bile in the stools; loaded or dark urine, with a more or less copious sediment; occasionally pain in the eyes and forehead; and mental depression, with disinclination to mental or physical employment.

14. iii. *Complications.* — This complaint may be symptomatic of other affections, particularly of those already alluded to. It may also occasion various associated ailments. When arising from previous disorder of the stomach or of the intestines, or of the liver itself, the primary affection will be more or less increased by it. The associated ailments, with some of which it often stands in the relation either of cause, or of effect, are chiefly, indigestion, constipation, diarrhœa, jaundice, colic, hypochondriasis, agues, rheumatism, gout, herpetic and other cutaneous affections, enlargements of the spleen, asthmatic seizures, dropsy, and palpitations or other irregular actions of the heart. I have often had occasion to observe, that, when any of these complaints was attended by the symptoms characterising this affection, if a purgative succeeded in procuring copious bilious evacuations, a very beneficial effect speedily followed. In many of these morbid associations, a very gentle aperient has produced a very violent operation, but the result has always been most salutary. A lady was subject for some time to palpitations, intermissions of the pulse, with great uneasiness at the præcordia. Various opinions were given as to the nature of the disease. Having been consulted, I observed several of the symptoms indicating accumulations of bile on the biliary passages. A moderate dose of calomel to be taken at bed-time, and a mild purgative draught in the morning, were prescribed. Violent catharsis followed; and the disordered action of the heart disappeared. In 1822, I was requested by a practitioner to see a patient with him, labouring under a severe attack of asthma. He had been purged, but without relief. I inferred from the symptoms, that accumulations in the biliary passages had favoured the accession of the seizure; and therefore prescribed, in addition to other means, five grains of calomel, with one of ipecacuanha, and five of the extract of henbane, to be given at night, and a stomachic aperient in the morning. The former of these procured an irruption of acrid bile into the duodenum to such an amount as to occasion violent cholera; the morbid bile, in passing through the rectum, occasioning severe scalding and excoriation around the anus. — A military officer, who had suffered several attacks of ague, was seized with it in London, during an easterly wind in March. The practitioner who attended him had prescribed purgatives, and the sulphate of quinine, without benefit. I recommended a bolus to be given at bed-time, containing twenty grains of calomel, five of James's powder, and three of camphor, in conserve of roses; a purgative draught in the morning, and persistence in the use of quinine. Before the purgative draught was taken, violent bilious purging came on, and he had no return of the ague. I could adduce, if it were requisite, numerous instances illustrative of the importance of attending to the association of the morbid state now under consideration, with other ailments. I know of no disordered condition which so generally *predisposes*, or so frequently *gives occasion*, to other and more severe diseases, as this.

15. iv. The *Remote Causes* of accumulations of bile are numerous, and not fully recognised by writers. From my own observations in this climate, as well as in warm and other countries, I believe that they will be found to be the following. — (*a*) *Predisposing.* — A warm, moist, low, and miasmatous climate; mental depression, anxiety, and grief; general debility, and weakness of the digestive organs; the bilious, melancholic, or phlegmatic temperaments; sedentary occupations, indolence, and confinement; insolation; too full living, and the use of too much animal food; indulgence in wine or spirituous liquors; and venereal excesses. — (*b*) The *exciting causes* are — the sudden or protracted abstraction of the heat of the body, especially when in an inactive state, as sleeping with too few clothes, or in a damp bed, and the ingestion of cold drinks or ices; neglect of the bowels; and agues, or previous disorder of the biliary apparatus.

16. v. *Treatment.* — The means to be employed for the removal of this disorder are so evident as scarcely to require remark. Cases, however, occur, in which some discrimination, as to the choice of medicines for the evacuation of the accumulated secretion, is necessary. In general, the milder purgatives should be first prescribed; and, if these fail, the more energetic may be employed. It often happens, particularly when the bile has become inspissated, or when the gall-bladder and ducts have had their contractility much impaired by over-distension, or by any other cause, that the repeated exhibition of chologogue purgatives is necessary. But in other cases, especially when the bile has acquired acrid qualities, the gentler means will be the least likely to produce the severe effects often following the first dose of a purgative, after the disuse of this kind of medicine for some time. Accordingly, five grains of blue pill, or of Plummer's pill, may be given at bed-time, and a mild aperient draught the following morning. The evacuations should be inspected, and the repetition of these, or the selection of more active means, determined upon from the appearances they will present. If it should be necesary to repeat the purgative frequently, the mercurial ought to be given with caution, or only on each second or third night, and either of Formulæ 205. 266., or of the following, should be taken on the following morning, and on the intervening nights, until all biliary collections have been removed: —

No. 230. ℞ Infus. Sennæ Comp., Infus. Gentianæ Comp., āā ʒ vj.; Potassæ Sulphatis ℈ j—ʒ ss.; Extracti Taraxaci ʒ ss—℈ ij.; Tinct. Cardamom. Comp. ʒ jss. M. Fiat Haustus, horâ somni vel primo mane sumendus.

No. 231. ℞ Infus. Calumbæ, Infus. Sennæ Comp., āā ʒ vjss.; Sodæ Sub-carbon. gr. xv.—℈j.; Extr. Taraxaci ℈ ij.; Tinct. Cardamom. Comp. ʒ jss. M. Fiat Haustus ut suprà sumendus.

No. 232. ℞ Potassæ Supertart. in pulv. ℥ss.—ʒvj.; Confect. Sennæ ℥ss.; Syrup. Zingiberis q. s. ut fiat Electuarium molle, cujus dimidium sumatur horâ somni, vel mane nocteque.

17. The above are generally sufficient to accomplish the ends in view. But sometimes they fail, although repeated, to procure a sufficient evacuation of bile, or to remove all the symptoms depending upon collections in the biliary passages. When this is the case, a full dose of calomel, with James's powder or camphor, or ipecacuanha, or with the compound camboge pill, or the compound extract of colocynth, may be given at night; and either of these draughts, or a solution of neutral salts, in the morning. An emetic is often beneficial in such circumstances, before these measures are resorted to. When there appears reason to believe that the accumulation of bile arises from active congestion of the duodenum, particularly when the symptoms of inflammatory indigestion are present, or when the indications of spasm in the ducts seem to exist, calomel is generally necessary, and it may be repeated with advantage. The combination, also, of ipecacuanha or antimony, with the purgative taken at night, promotes the action on the biliary organs. In some obstinate cases, when it was necessary to repeat the purgatives frequently, I have given colchicum, in either of the above draughts, with benefit. Besides these, frictions with stimulating liniments over the right hypochondrium and epigastrium, or a blister, the nitro-muriatic acid lotion, or the emplastrum ammoniaci cum hydrargyro, in the same situation, may be prescribed. A healthy air, or change of air, regular exercise, particularly horse-exercise, early hours, and the use of the Cheltenham mineral waters, or the artificial mineral waters of Seidschutz or of Pullna, with attention to diet, will materially promote the action of the biliary apparatus.—The treatment is in other respects similar to that advised in the articles on Constipation and Indigestion.

III. Excessive Distension of the Gall-bladder.

18. i. It is not often that the accumulation of bile in the gall-bladder is so great as to give rise to an external tumour, as its discharge into the duodenum generally occurs before it reaches this extent. But cases sometimes are seen in which a very distinct tumour is formed by the distended gall-bladder, in one of the following situations: — 1st, In the epigastric region and a little towards the right side; — 2dly, Immediately below the cartilaginous margins of the right ribs; — 3dly, Lower in the hypochondrium, and directed either downwards, or upwards, or even backwards, but most frequently rising into the epigastrium;—and, 4thly, Descending down either towards the umbilicus, or to the crest of the ilium, or between these situations.—The distension of this viscus *arises* — (*a*) from inflammation and tumefaction, or thickening, &c. of the coats of the common duct, occasioning more or less narrowing or complete obstruction of its canal; — (*b*) from similar lesions, or tumours, in the duodenum, implicating the termination of this duct; — (*c*) from the arrest of a biliary calculus in the same situation; — (*d*) from tumours in the pancreas, pylorus, or adjoining parts, or even in the liver itself, pressing upon this duct; — (*e*) From the entire obliteration of the duct, in consequence of either of the foregoing lesions;—and (*f*) possibly from spasmodic constriction, or from the accumulation of thickened bile or mucus in the canal. Of these five alterations, all but the last have been observed by me in *post mortem* examinations. The last very probably has existed in some of the cases in which the tumours have disappeared with more or less rapidity.

19. The tumour, thus formed by an excessively distended gall-bladder, may — α. continue during the remaining life of the patient; β. or disappear after a longer or shorter time, its subsidence being either slow or rapid. This latter event may proceed either from the removal of the obstruction in the common duct, whether this have been spasm, inflammation, or any of the more mechanical obstacles just mentioned; or from the gradual absorption of more or less of the bile in the bladder. When absorption of the contents of this viscus proceeds, an additional quantity not passing into it, the tumour will disappear slowly and gradually. Instances have occurred, however, in which the coats of the gall-bladder, owing to the great distension, or to the acrimony of the contained fluid, have become inflamed, or ulcerated, and have subsequently been perforated or ruptured, the contents being effused, either into the peritoneal cavity, giving rise to intense and rapidly fatal peritonitis, or into some other viscus with which the gall-bladder had previously formed adhesions. Cases of this kind have been recorded by Schenck, Bertin, Alberti, Salmuth, Bonet, Desjardies, Portal, Frank, Double, and Porral. The accumulated bile may even be poured out externally, owing to the adhesion of the gall-bladder to the abdominal parietes, and to the inflammation, ulceration, and perforation having proceeded from the former to the surface of the latter. Horstius, Bloch, Amyand, and De Haen have detailed cases of this description.

20. Although calculi lodged in the common duct most frequently occasion distension of the gall-bladder, yet this cause may exist without this effect being observed; or it may have been present and have gradually subsided. M. Duplay (*Journ. Hebdomad.* t. iii. p. 14.) has adduced a case, in which this duct was completely obstructed by a calculus, the hepatic ducts and their radicles having been much dilated, and yet the gall-bladder was atrophied, and reduced to a simple canal with thickened parietes. Inflammation of the gall-bladder had most probably supervened in this instance, and been followed by thickening and constriction of its coats, with absorption of its contents. M. Petit thinks that inflammatory engorgement and tumefaction of the liver is often concerned in producing accumulation of bile in the bladder; and that, when the resolution of the inflammation is followed by a copious secretion of this fluid, before the congestion or tumefaction and obstruction of the common duct have been removed, the distension of the gall-bladder will often be excessive. From whatever cause it may arise, the accumulation is often remarkable. In a case related by Mr. Gibson (*Edin. Med. Essays*, vol. ii. p. 352.), the tumour was so large as to reach over to the left hypochondrium, to force out the false ribs of both sides, and to occasion great difficulty of breathing. The common duct was found after death obstructed by concretions, and the gall-bladder contained eight pounds of thick bile.—Young (*Philos. Trans.* vol. xxvii.)

found, in the body of a middle-aged female, a similar obstruction, and nearly the same quantity of thick bile in the gall-bladder. Parallel instances, to which references are made at the end of this article, are recorded by VESALIUS, GOLDWIZ, HEUSINGER, HAUTESIERK, AMYAND, VETTER, KRAEFF, VAN SWIETEN, DUVERNEY, PEZOLD, WIEDEMANN, and others.

21. The *contents* of a distended gall-bladder do not always consist of bile. In rare instances, purulent matter, or numerous biliary concretions, have been collected in it. — The former has generally passed into it from an abscess in the liver, either along the ducts, or subsequent to adhesions formed between the external surfaces of the liver and gall-bladder. — MORGAGNI and FANTONI found it distended by air.

22. ii. *Diagnosis*. — A tumour arising from accumulations of bile in the gall-bladder may be mistaken for an *abscess of the liver*, or for *encysted dropsy*, or for a *tumour containing hydatids*; and, if an opening were made into it, in the supposition of it being either of these, a fatal result would immediately ensue, unless adhesions had previously formed between the gall-bladder and the parietes of the abdomen, which rarely take place. It, therefore, is very necessary to distinguish between these diseases and an excessive distension of the gall-bladder. — (*a*) The diagnosis between this latter and *abscess of the liver*, pointing externally, is often difficult. In a case which I had an opportunity of seeing, the surgeon was about to puncture the tumour; when delay having been suggested, and chologogue purgatives prescribed, the tumour disappeared after a copious discharge of bile. A similar case was lately reported in one of the London Medical Journals. M. PETIT, having been consulted in a case that had been considered abscess of the liver, had commenced with the operation for the removal of its contents; but as soon as he had divided the integuments the tumour became soft, and instantly afterwards subsided. He closed the incision and proceeded no further, telling the assistants that this occurrence had shown him the nature of the disease, and that copious bilious evacuations would soon take place. This directly occurred, and the patient recovered. — The symptoms distinguishing between these two lesions are the following: — 1. The rapid appearance and circumscribed form of the tumour, with manifest fluctuation throughout its extent, when it proceeds from the gall-bladder. — 2. The softness and mobility of the integuments over the more prominent parts of the tumour; and the absence of a diffused swelling or hardness at the circumference, and of œdema, or of an emphysematous feel, when it is thus produced. — 3. Abscess of the liver is consequent upon inflammatory symptoms referrible to this viscus. The tumour it occasions forms slowly; is attended with great swelling, and tension in the parts adjoining; and is at first diffused, hard, and imperfectly defined. Fluctuation is very obscure, occurs late in the progress of the swelling, and is confined to the centre, the circumference being hard and tumid. — 4. There are always febrile symptoms attendant upon this disease; but they are seldom observed in distension of the gall-bladder, unless inflammation has supervened. — 5. Pain in suppuration is pulsatory, in the other it is not; and it generally intermits. — 6. Shivering is more frequently present in suppuration, or continues longer, than in distension of the gall-bladder; and it terminates in perspiration, which rarely occurs in the latter. — 7. A distended gall-bladder presents more of the appearance of a deep-seated encysted tumour than of abscess. — (*b*) The swelling from *encysted dropsy* is larger, and the fluctuation more distinct, than from a distended gall-bladder. — (*c*) The same remark, however, does not apply to the *encysted tumours* that contain hydatids. Between both these and distension of the gall-bladder, the diagnosis is often very difficult, unless the appearances of the evacuations, and of the skin, are closely observed. In the latter, the stools are devoid of bile — are white or clayey, &c.; the urine is very dark, loaded, and clouded; and the skin discoloured or jaundiced. In the former, the stools are rarely without bile, and the other symptoms are seldom observed; as there is no interruption of the passage of this secretion into the duodenum, nor suppression of the function.

23. iii. The *Treatment* of excessive distension of the gall-bladder should not be materially different from that advised for the common occurrence of impaired action of the biliary passages (§ 16.). The alkaline subcarbonates, the spirits of nitric ether, and the extract of taraxacum, in liberal doses, either in camphor julap, or in the medicines prescribed above (§ 16.), or in the decoction of taraxacum, will often be serviceable; especially when the use of them is steadily persisted in, is varied according to circumstances, and is aided by the external remedies already mentioned (§ 17.). When the distension seems to arise from the arrest of biliary concretions in the common duct, or, indeed, from any other cause, the liquor potassæ, Castile soap, the sub-borate of soda, antimonials in small doses, anodynes, the warm bath, and oleaginous aperients, as olive oil, &c. will be the most useful. — *Emetics* are dangerous; but laxatives, mild purgatives, and aperient enemata are beneficial, and should be continued from time to time. In all cases of biliary obstruction, the means enumerated at another place (see art. CONCRETIONS. — *Biliary*, § 14. *et seq.*) will be also very appropriate. — The most suitable *beverages* are the common imperial drink, or a solution of equal parts of the supertartrate of potash and sub-borate of soda, dissolved in a weak decoction of marsh-mallows, or of taraxacum, with a little orange-peel, &c.; or warm whey, or soda water, or spruce beer. The factitious waters of Seidschutz, or of Geilnau, or of Marienbad, or the mineral waters of Seidlitz, of Leamington, or of Scarborough, are often of service both in this and other forms of biliary obstruction. But I believe that there is no mineral water more beneficial than that most common of all mineral waters, namely, sea water, when it is taken in sufficient quantity, and persisted in for a reasonable period.

IV. INFLAMMATION OF THE GALL BLADDER AND DUCTS. *Hepatitis Cystica*, Sauvages; *Cholecystitis*, Hildenbrand.

CLASSIF. — II. CLASS, III. ORDER (*Author*).

24. DEFIN. — *Deep-seated acute pain in the epigastric region, extending to the right hypochondrium, and backwards, generally with vomiting of a greenish bile, frequently with jaundice, and always with symptomatic fever.*

25. i. The *Symptoms* of inflammation of the gall bladder or ducts are extremely fallacious. This disease may be either acute, sub-acute, or chronic; and, in either of these states, it is generally consecutive of inflammation of the concave surface of the liver, or of obstructions of the ducts, or of the irritation of biliary concretions; and hence its approach is slow and insidious, or the symptoms attending it are merely an aggravation of those produced by the antecedent disorder. This is especially the case when it occurs in a chronic or sub-acute form. Chills or rigors may or may not not occur; but they are generally preceded by pain, more or less severe and acute, in the situation mentioned above. Vomiting is frequently present, and the matters ejected are often greenish. There is great tenderness at the epigastrium; and pressure is apt to excite vomiting. Severe colicky pains are felt in the upper regions of the abdomen; and jaundice sometimes appears suddenly. The attendant fever is characterised by a small or constricted pulse; by evening exacerbations; by a very dark, turbid, and scanty urine, and by thirst. The stools are generally devoid of bile. These are the most constant symptoms of inflammation of this viscus; but they are not altogether to be depended upon; for they are usually present in hepatitis, and even in duodenitis or gastritis. — Another circumstance, which adds to the difficulty of diagnosis, besides its mode of accession, is its frequent *complication* with these diseases, or with dropsical effusion, especially in the abdominal cavity. But inflammation of the gall bladder or ducts is often consequent upon excessive distension; and, when this is the case, the characteristic symptoms commonly follow a more or less distinct tumour in some one of the situations I have noticed above; and the nature of the complaint is thereby made manifest; jaundice and white stools, with very dark urine, being then seldom or never wanting.

26. ii. *Changes consecutive of Inflammation of the Gall-bladder, &c.*—These are various. I shall take a brief view of the most common. — (*a*) *Suppuration, ulceration,* and *softening,* are not infrequent. The gall-bladder may be almost filled with *pus* from inflammation of its internal surface; but the admixture of pus with the bile, and ulceration, are more common. Cases of this kind have been noticed by Vetter, Morgagni, Amyand, Walter, Morand, Frank, Baillie, Soemmerring, Martin Solon, and Andral. The ulceration may pass into *perforation,* or even *rupture,* without any very considerable distension of the viscus having previously occurred; the bile being effused in the peritoneal cavity, or into some adjoining viscus, in the manner already noticed (§ 19.). In cases of ulceration and rupture, *softening* is not often absent; and probably it favours the latter occurrence. — (*b*) *Gangrene* is a very rare occurrence. I have seen it mentioned only by J. P. Frank. — (*c*) When inflammation either commences in, or extends to, the more external coats of the gall-bladder, *adhesions* of it take place to adjoining parts. It has been seen adhering to the peritoneum, by Bloch, Petit, &c. — to the omentum, by Walter — to the duodenum, by Ludwig, Frank, Porral, Reynaud, myself, and others — to the colon, by Walter, &c. — and to the liver, by Annesley, myself, and several writers. These adhesions may exist either with or without distension, or the presence of biliary concretions; but either, or both, are often observed, or have manifestly existed at one period or other of the disease. — (*d*) *Thickening* of the coats of the viscus is evidently a consequence of inflammation in some one of its grades. It has been remarked by Schmalz, Walter, J. P. Frank, Soemmerring, Andral, and myself. Stoll and Leveillie have noticed the thickening, conjoined with a *cartilaginous induration.* — (*e*) *Ossific deposits* in its coats have been found by Rhodius, Walter, Murray, Grandchamp, Mollinelli, Baillie, and Andral.

27. There are *various other alterations* of the gall-bladder which do not necessarily arise from any grade or mode of inflammation, and which may be noticed at this place. — *α*. The gall-bladder may be *hypertrophied* in respect both of its capacity and the thickness of its coats. The simple distension arising from obstruction of the common duct cannot be justly called hypertrophy, although some French pathologists have thus denominated it. — *β*. *Atrophy,* or wasting, of it is not uncommon, even as a consequence of chronic inflammation affecting either itself or the ducts, particularly the cystic duct. Instances of this change are recorded by Morgagni, Walter, Rossi, Soemmerring, Hufeland and Andral. In these cases, the passage of bile into or from it having been prevented, the portion of this fluid contained by it has been absorbed, and the functions of the viscus having ceased, its structure has gradually wasted, until it has almost disappeared. — *γ*. Instances, in which the gall-bladder has been either congenitally *wanting,* or has *disappeared* from antecedent disease, have been adduced by Fernelius, Marcellus Donatus, Schenck, Huber, Morgagni, Jaeger, Ludwig, Sandifort, Zeigler, Baldinger, Lemery, Boulet, Targioni, Tozzetti, Littre, Wiedemann, Otto, Dendy, &c.—That this viscus may entirely disappear, in the same manner as it becomes atrophied, may be admitted. When only atrophy has occured, there is still some little cavity left; but when the bladder has disappeared, the cystic duct is reduced to a fibrous chord terminating in a mass of cellular tissue. — *ε*. The coats of the gall-bladder may, moreover, be infiltrated with serum, or contain *tuberculous,* or *calcareous matters.*

28. iii. The *Ducts* — the *hepatic, cystic,* and *common* — are liable to all the changes noticed with reference to the gall-bladder—to distension, obstruction, inflammation, thickening, ulceration, softening, perforation, rupture, hypertrophy, atrophy, obliteration, &c. — The *symptoms* however, attending these lesions during life are very equivocal. The symptoms, proceeding from inflammation closely resemble those enumerated as indicating inflammation of the gall-bladder. Most of the changes, to which the ducts are obnoxious, are the effects either of concretions obstructing and irritating them, or of inflammation having extended to, or been excited in, them. Inflammation, whether it extends to them from the duodenum, or from any other part, or arises from the acrimony of the secretion passing along them, is equally accompanied by swelling of their coats, and by more or less complete obstruction of their canals, often with softening or ulceration. — *Constriction* or *narrowing* from this cause has

been observed by **Bonet**, **Hoffmann**, **Mead**, **Bianchi**, **Brüning**, **Crichton**, **Baillie**, **Andral**, &c.; and complete *obliteration* of one or other of them has been remarked by myself and most of the writers referred to in this article.—*Ossification* of them has been seen by **Bonet** and **Soemmering**. — *Dilatation*, principally of the common and hepatic ducts, is recorded by **Schenck**, **Duverney**, **Morgagni**, **Walter**, **Richter**, **Duplay**, **Andral**, and **Todd**. — *Rupture* of these ducts has occurred to **Wolff**, **Andral**, and others. References to all the foregoing lesions will be found at the end of the article.

29. iv. *Spasm of the Bile-ducts.*—The existence of this disorder has been presumed rather than proved. Without denying, however, its occurrence, particularly when acrid bile, or gall-stones, are passing along the ducts, I believe that it seldom takes place unless from these causes, and in connection with inflammatory irritation.—The instances of sudden appearance of jaundice sometimes met with have been imputed to spasm of the ducts; but, although spasm may occur independently either of inflammation, or of biliary concretions, yet the pathological state producing jaundice is most frequently seated in the liver itself. The affection, therefore, which has been generally ascribed to spasm of these canals should be rather imputed to either of the above causes, or to any two of them — 1st, to inflammatory irritation without calculi; 2dly, to the irritation produced by calculi; 3dly, to irritation caused by acrid bile; 4thly, to spasm chiefly; and 5thly, to either of the foregoing in connection with spasm. — It is hence most difficult to distinguish spasm from inflammation of the ducts, or either of these from the passage of gall-stones. Indeed, the symptoms indicating the latter are in no respect different from those attending upon most of the cases generally imputed to spasm. — A sudden, sharp, deep-seated, and severe pain at the pit of the stomach, darting back to the right side of the spine, or to the lower angle of the right shoulder-blade, and to the hypochondrium, occurring in paroxysms, and often followed by rigors, coldness of the extremities, &c., are felt in both. Nausea and vomiting are sometimes also present. When, however, the disorder proceeds chiefly from spasm, pressure gives relief of the pain in the epigastrium, as well as of the colicky pains usually felt at intervals in the abdomen. — The patient commonly turns upon his belly, or lies partly on the right side, and partly on the abdomen. This, in connection with the slight affection of the pulse, chiefly distinguishes spasm, from inflammation, of the ducts. In other respects the symptoms are nearly the same as those stated to indicate the passage of the gall-stones. — (See art. **Concretions** — *Biliary*, § 8.)

30. v. **Treatment.** — *Inflammation of the gall-bladder and ducts* should be treated in a nearly similar manner to other inflammations, but with reference to the organisation and functions of the part. The *first intention* should be, to remove the inflammation; the *second*, to procure a free and healthy flow of bile into the duodenum. *Bloodletting*, both general and local, is always requisite; and generally tends to the fulfilment of both indications. Immediately after the first bloodletting, a full dose of *calomel* — from five to twenty grains — according to the age and strength of the patient, with *James's powder* and *opium* or *hyoscyamus*, may be given, with few exceptions. Experience has proved the propriety of exhibiting one or two doses of this medicine, in cases where these parts have been either partially or chiefly implicated, and the experiments of Mr. **Annesley** have demonstrated the influence of a large dose of calomel in diminishing inflammatory irritation of the stomach and duodenum,— an effect which, if produced in these viscera, will probably extend to the gall-ducts. If a repetition of the bleeding should be necessary, the calomel, antimony, and opium may be repeated immediately afterwards, as this combination has a most decided effect, when thus exhibited, in diminishing vascular action, and in equalising the circulation. Mild *aperients* and *cathartic enemata* may subsequently be given; and, having thereby procured evacuations, medicine of a *deobstruent* and *relaxant kind* should be prescribed. The *alkaline subcarbonates* with *taraxacum*; the *subborate of soda*, in the *decoctum althææ*, with small doses of *ipecacuanha*, and of the powder or the extract of the leaves of *belladonna*, and the *nitrate of potash* or *muriate of ammonia*, in camphor mixture, with large doses of the *spirits of nitric ether*; are the most appropriate medicines; but they should be given in repeated doses, and so as not to offend the stomach.

31. Of the *external applications*, the most efficacious are the warm *terebinthinated embrocation*, *warm poultices*, *fomentations*, and afterwards a plaster, consisting either of the *emplastrum ammoniaci cum hydrargyro*, or chiefly of the extract of *belladonna* and *camphor*, according to the peculiarities of the case. — Having removed inflammation, and relieved the more urgent symptoms, by these or similar means, a due flow of bile into the duodenum should be promoted by small doses of blue pill, or of **Plummer**'s pill, the liquor potassæ, or the subcarbonates of soda or potash, or the subborate of soda, or the acetate of potash, or the extracts or decoction of taraxacum or of chelidonium, or the ethers, &c. variously combined. A gentle action on the bowels, by emollient and oleaginous medicines, should be continued for some time. If pain of a spasmodic kind recur, belladonna, or hyoscyamus, or opium, or colchicum, may be given with these; and if the irritation seem to be owing to the presence of gall-stones, the combination of the spirits of turpentine, with sulphuric ether as advised by **Durande**, **Straub**, **Witting**, **Quarin**, and others, or with alcohol, as recommended by **Percival**, or with the spirits of nitric æther as directed by **Wolf**, may be tried. An anodyne may also be given with either of these combinations, especially hyoscyamus, or belladonna. — *Colchicum*, with the alkaline subcarbonates, has proved of great benefit in some cases in which I believed the biliary passages to have been implicated in the inflammation of the associated viscera; and *prussic acid*, given in full doses with olive oil, or with almond oil and camphor julap, has afforded great relief where there was every reason to suppose that gall-stones or spasm was the cause of suffering.— The treatment in other respects, as well as the diet and regimen of the patient, are altogether the same as are fully detailed in the articles **Concretions** — *Biliary*, and **Jaundice**.

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GANGRENE. — Syn. *Gangræna ; Sphacelus ; Mortification.* — Γάγγραινα (from γράω, I eat or devour). *Gangrène* ; Fr. *Der Brand*, Germ. *Cangrena*, Ital. :

Classif. — IV. Class, IV. Order (*Author*, in *Preface*).

1. Defin. — *Death of a part or the whole of an organ.*

2. The terms *gangrene*, *sphacelus*, and *mortification* are usually applied to the same condition, especially by Continental writers. Dr. Carswell has pointed out certain distinctions between them, restricting the first appellation to incipient mortification, and the second to the last stage of this lesion. He has thus made Mortification to be the generic term. This is in accordance with the meaning usually attached to the terms in this country ; but, as mortification is the last result of the morbid state—is no longer a disease, but its termination — I have preferred the first of these appellations ; and especially as it is the most appropriate to the changes generally comprised under these terms, and as it is usually applied to a lesion which, in respect of its nature and treatment, comes much more within the province of the medical practitioner, than that which the terms sphacelus and mortification are generally employed to represent. — Formerly, gangrene, particularly in its medical relations, was considered merely as a consequence of inflammation ; but a more extended view of it has been taken by some Continental writers : and, still more recently, it has been treated by Dr. Carswell in an able and comprehensive manner. The *division* of this subject must necessarily have an intimate relation to the principal causes which produce it. In considering, therefore, the *pathological relations of gangrene*, I shall view it successively — 1st, As a consequence of inflammation ; 2dly, As a result of local or general debility or exhaustion interesting chiefly the organic nervous influence ; 3dly, As an effect of obstructed circulation ; 4thly, As produced by various physical agents ; and 5thly, As occasioned by poisonous substances.

3. I. — Pathological Relations of Gangrene. — i. Gangrene Consequent upon Inflammation. — All parts susceptible of inflammation may become gangrenous in consequence of it ; but there are various circumstances that cause this change to be more common in some tissues or parts, than in others. The *vascularity* of a part disposes it to inflammation, and consequently to gangrene. Hence, cellular and mucous tissues are much more liable to it, than fibrous and serous structures. The latter never experiences it until the cellular tissues by which they are nourished have undergone a similar change. — The *sensibility*, *excitability*, and *susceptibility* of a part have also a great influence in producing it ; the disposition to inflammation, and to gangrene as one of its results, being in proportion to the grades of these properties with which an

organ or structure is endowed. — The *situation of a part or structure* at a distance from the centre of vital or nervous influence, and of circulation, has also some influence in favouring the termination of inflammation in gangrene. Also, intense grades of inflammation in these parts may proceed until this result takes place, without causing death; whereas inflammations of the more vital and central organs, as the heart, brain, &c., put an end to life before this change has supervened.

4. *Various pathological states* dispose not only to inflammation, but also to the supervention of gangrene. The most important of these are — *a.* Disorder of the digestive organs, especially impaired energy of the organs most directly influenced by the organic nervous system; — *b.* A weak and irritable state of constitution; — *c.* Exhaustion by previous disease, particularly by fevers and epidemic maladies; — *d.* Interruptions of the excreting functions, and of the depurative action resulting therefrom; — Morbid conditions of the blood, as in typhoid, malignant, and exanthematous fevers, in erysipelas, and in scurvy; — *f.* Pre-existent functional or structural changes in a part, as impeded circulation, congestion, &c.; — *g*, Interrupted circulation in an adjoining organ, or obstructed return of the venous blood from the part affected. These conditions not merely predispose to inflammation, but also modify its characters, and favour most remarkably the occurrence of gangrene, especially when more than one of them are in operation; as in erysipelas, in which we generally observe the inflammatory action supervene on marked disorder of the digestive and excreting functions, on a morbid state of the circulating fluids, and on disordered circulation in the part.

5. The *Causes* which induce inflammation also influence its termination in gangrene, but to a much less extent than the influences already noticed, unless they be of a disorganising or poisonous kind, when they more properly fall under a different head. *Intensity of the exciting causes*, relatively to the excitability and susceptibility of the part, have some influence, especially when it is great; the consequent vascular reaction, in connection with the morbid impression made by the cause upon the vital properties of the part, often rendering inflammation more acute and severe, and thereby more prone to exhaust vital power, or to pass into gangrenous disorganisation. But agents which excite inflammation, without producing a mechanical, chemical, or poisonous operation, do not very remarkably favour the occurrence of gangrene, independently of this circumstance, and of those already enumerated. The disposition to terminate in gangrene will doubtless be increased by the *intensity of the local and general vascular action* relatively to the state of constitutional power; but such intensity of action will itself, in a great measure, result from the circumstances already enumerated. In a word, therefore, the causes of inflammation passing into gangrene, are those stated above, in connection, with peculiarity of temperament, constitution and habit of body, and with the intensity of local and general vascular action, relatively to vital resistance or power, characterising the inflammatory state.

6. *A. Of the Phenomena of Gangrene from Inflammation.* — *a. In respect of particular Tissues and Organs.* — *α. Of the integuments.* — When inflammation is about to pass into gangrene, very evident changes take place in the *colour, temperature, sensibility*, and vital *cohesion* of the part. The redness becomes darker, or changes to a livid, violet, purplish, or black hue. The morbidly increased temperature and the augmented sensibility of the inflamed part are remarkably lessened; and the pain has disappeared from it, and extended to the surrounding structures. The vital cohesion of the part is much weakened, although its density is sometimes augmented. — Vesicles also appear on the surface, owing to the effusion of serum, or of a sanguinolent serum, under the cuticle. — These changes become more manifest as the gangrene passes into its second stage, or sphacelus. The colour becomes grey, yellowish grey, greenish, brown, or black, or various intermediate shades. The vesicles are now enlarged, or the cuticle is entirely separated by the effusion of a bloody serum beneath it, which escapes and leaves the skin loosely covered by it, or partially denuded and discoloured. The integument crepitates on pressure, is puffy, soft, cold, and insensible. It soon afterwards emits a cadaverous and offensive odour, indicating that the gangrened part is quite dead, and is undergoing decomposition.

7. The emphysema and fœtor of the part are proofs of the gangrene having arrived at complete mortification and putrefaction; but the part may be completely dead without these phenomena being observed. Among the chief changes that occur after gangrene has taken place, are the *spreading* and *limitation* of it. The former is increased by whatever depresses the organic nervous power or contaminates the blood; and, as long as it continues, the dark red or livid discolouration attending it extends further and further, and gradually disappears in the surrounding sound skin. The latter change is promoted by whatever restores nervous energy, increases vital resistance, and promotes the assimilating and excreting functions. As soon as it commences, the livid or dark red discolouration of the circumference or margin of the gangrened part is more narrowed. Ulceration commences at the margin of the inflamed part, and separates from it, in the form of slough, the portion which had become gangrenous. The loss which is thus occasioned, is partially repaired by the exudation of coagulable lymph, which, becoming organised in the form of granulations, assume more and more of a membranous form, and constitute, in its complete state of reparation, the cicatrix. — A favourable change in the part and in the constitutional affection may occur at an early period of gangrene, and the result may be still more felicitous. In this case, the dark red or livid colour of the affected part becomes more circumscribed, and assumes a brighter tint: the swelling subsides, and the temperature gradually returns; all the functions, as well as the organisation, are preserved. — Gangrene of the skin always implicates to a greater or less extent the subjacent cellular tissue; but this latter may be the primary and chief seat of this change.

8. *β. Gangrene of the cellular tissue.* — This tissue is more frequently, more extensively, and more rapidly affected by gangrene than any other part, more particularly where it is most abundant or is covered by aponeurotic expansions, which prevent contaminating fluids from reaching the

surface.—Gangrene of this tissue is either *diffused* or *circumscribed*. In the *diffused form*, it generally occurs in external parts, and most commonly follows erysipelas, and diffused inflammation of the cellular tissue from abrasions, wounds, punctures, and the inoculation of morbid or putrid matter, as by wounds in dissection. In these cases the inflammation spreads rapidly and extensively, terminates quickly in gangrene, and often extends to the blood-vessels, tendons, aponeuroses, and lymphatics. These resist, for a longer time, the disorganising process; and are often seen, especially in the extremities, running in the midst of decomposed cellular tissue, and of effused fluids. If the inflammation affect the interior of a considerable venous or arterial trunk, particularly that which chiefly supplies a limb, the circulation through it is interrupted by the lymph effused in its canal, and the entire part beyond the seat of obstruction is struck by gangrene. In the internal viscera, gangrene very seldom occurs in a diffused form, unless in cases where erysipelas extends to the fauces and parynx, or in the more malignant cases of angina.

9. *Circumscribed gangrene* of the cellular tissue is seen in that connected with the integuments, in the common boil, and in carbuncle. When gangrene is observed in the cellular tissue of internal organs, it almost always is circumscribed. When the *submucous tissue* is its seat, it generally is in spots or patches of various dimensions, and is consecutive of inflammation which has commenced in the mucous membrane, and extended thence to the submucous tissue. In such cases, particularly in dysentery, considerable portions of the mucous surface are detached, owing to gangrene of its subjacent tissue. —Although gangrene of the *subserous cellular tissue* is more or less circumscribed, yet it is often extensive; but, in these latter instances, the serous membrane is also implicated. This is especially the case when the sub-peritoneal tissue is the seat of lesion. It is rarely, however, that the inflammation of it, which terminates in this manner, commences in the peritoneum, unless in some cases of strangulation from hernia or intro-susception. It commonly either originates in the cellular tissue itself, or extends to it from adjoining parts. Indeed, this is always the case in respect of the subperitoneal tissue of the lumbar, iliac, and pelvic regions.

10. γ. *Mucous membranes* are sometimes found gangrenous; but not so frequently as was supposed by the older writers, who mistook softening, discolouration from the imbibition of morbid secretions, and even albuminous exudations thrown out on their surfaces, in the form of false membranes, for sphacelation.—Gangrene of this membrane is generally circumscribed, often very limited, and seated chiefly in the throat, the lower part of the ilium, in the cæcum, the sigmoid flexure of the colon, and in the rectum. The inflammation producing it commences, and is chiefly seated, in the mucous tissue itself, or in the follicles, or in both. The gangrene may be limited to either of these, or may extend to both, and even to the subjacent cellular tissue. Where thus changed, the mucous membrane at first presents an ash grey or greyish yellow colour, which often changes to brown or black; but the gangrened part may be tinged by the secretions or other substances applied to it, especially by the bile, or by the blood.—The part surrounding the slough is generally congested, of a brownish red, or of a purple, or livid hue. Dr. Carswell remarks that, when the inflammation has been confined to the agminated, or Peyer's, follicles, and when the greater part, or the whole, of the follicle has sloughed, little congestion or inflammatory redness may remain. If these glands are already the seat of disease — as in continued and hectic fevers, consumption, &c. — a slight attack of inflammation may destroy their vitality, and little or no vascularity may be observed around them after death. The mucous surface of the *bronchi* is rarely the seat of gangrene, and only consecutively of inflammation of adjoining parts. — Gangrene of the mucous surface of the *uterus* and *vagina* is not infrequently seen in dissections after puerperal fevers. (See Puerperal Diseases, and Uterus.)

11. δ. *Serous membranes* are the seats of gangrene, only consecutively of this, or of some other cause, as suppuration, ulceration, &c. in the subserous tissue, as noticed above (§ 9.). When ulceration of any part of the digestive canal extends to the peritoneal surface, this membrane, having lost the supply of blood from the subjacent tissue, sometimes experiences sloughing at the bottom of the ulcer, and consequent perforation. But this is observed chiefly when the ulcer is large, and the patient's habit of body cachectic; and most frequently in the lower part of the ilium.—The *pleura* is more rarely the seat of gangrene than the peritoneum; and the costal pleura is still more rarely affected than the pulmonary pleura. Gangrene of the latter is met with as a result of the softening of tubercles situated immediately underneath the pleura, or of gangrene of a subjacent portion of the lungs. — The serous membranes of the brain are gangrenous only as a consequence of severe injury; particularly when the membranes are exposed, and when the part is affected by erysipelas or hospital gangrene. This latter cause of gangrene of the cerebral serous membranes has been noticed by Mr. Copland Hutchison. When the serous membrane is sphacelated, it assumes an ash grey or slate colour; but it may be variously tinged by bile, blood, or morbid matters. It is also soft and spongy, and is readily detached from the surrounding tissues, which are usually more or less injected.

12. ε. *Fibrous tissues* become gangrenous only in consequence of this lesion in the immediately adjoining parts. — The *muscular tissue* is very rarely seized by gangrene after inflammation. The muscular tunics of the digestive canal are sometimes, however, thus affected, owing to the extension of gangrene from the associated tissues, as in the case of sloughing ulcers commencing in the internal coats of the tube. If recovery take place after a portion of the muscular tunic has been thus destroyed, the cicatrix which is formed contracts, as Dr. Carswell has stated, and the diameter of the canal is permanently lessened. — The *heart* is, perhaps, never even partially gangrenous whilst life continues; and the *arteries* and *veins* are never the seat of this change until the surrounding cellular tissue, and cellular coats of these vessels, are destroyed by it. Gangrene of the *brain*, of the *lungs*, of the *liver*, of the *spleen*, of the *kidneys*, of the *uterus*, &c. is

noticed in the articles devoted to the pathology of these organs.

13. *b.* The *changes which take place in the capillary circulation*, when the inflamed part is about to pass into gangrene, have been observed by several pathologists, but by none with so much care and precision as by Kaltenbrunner (*Exper. circa Statum Sang. et Ves. in Inflam.* 4to. Mon. 1826, p. 82.) and Gendrin (*Hist. Anat. des Inflam.* t. i. p. 31. *et passim*). According to their researches, and my own observations, the *capillaries* lose their tonicity and vital cohesion, become distended or even ruptured, or allow the exudation of a portion of their contents. At the same time, the *blood* in the distended capillaries ceases to circulate; changes from a dark red, to a dark brown or black hue; and coagulates; its globules uniting, adhering to the internal surface of the vessels, and filling their canals. A similar change takes place in whatever blood may have been effused into the areolæ of the tissues during the acme of the inflammatory state, or the passage of it into gangrene. This alteration of the blood and of the capillaries causes the livid, purple, or black hue of the affected part; and the loss of vital cohesion, and exudation of the serum, occasionally with some of the dark colouring matter of the decomposed blood, produce the soft pulpy state attending the passage of gangrene into sphacelus. With the cessation of circulation, the sensibility is quickly lost; and when the part is deprived of its vitality, incision of it neither excites sensation, nor causes loss of blood. Absorption, also, entirely ceases in the gangrened part; but proceeds with activity at the margins of the living and sphacelated tissues, as shown by the local and constitutional phenomena, and by the separation between the living and dead parts, which is partly occasioned by this process.

14. *B. Terminations, &c.* — The changes that take place in the margin of the living inflamed part are important, as upon these depends the occurrence of one or other of the following phenomena. — 1st. The limitation of the gangrene, and separation of the diseased part; — 2d. The spreading of the gangrene, and the contamination of the circulating fluids; — 3d. Dangerous or fatal hæmorrhage; — and, 4th. Ulceration. — (*a*) The *entire separation of the gangrened part*, in a state of sphacelus, is caused by the production of coagulable lymph in the inflamed parts surrounding the gangrene. This lymph prevents the decomposed fluids from contaminating the surrounding tissues, by agglutinating not only the areolæ of these tissues, but also the orifices or canals of the minute vessels. It also promotes the coagulation of the blood in the larger vessels, and thereby prevents the occurrence of hæmorrhage. It lastly, as the separation is perfected, becomes organised, in the tissues which it agglutinates, or in which it is effused, and is essential to the healing of the part.—(*b*) The *spreading of the gangrene* arises from the local and constitutional vascular action being so weak, or asthenic, or otherwise so morbid, as to be incapable of forming coagulable lymph, whereby the contaminating influence of the decomposed fluids and sphacelated tissues upon the surrounding parts may be resisted, the minute vessels agglutinated, their fluids coagulated, and absorption prevented. When this result is observed, the vital power of the part, or of the constitution, is in fault; and either a cachectic habit of body, or a morbid state of the blood, has preceded the occurrence of gangrene, as in erysipelas, scurvy, fever, &c. — (*c*) *Hæmorrhage* may attend either of the preceding states of sphacelation. In the former, it arises from an imperfect coagulation of the blood in the large vessels, at the margin of the living inflamed part; the lymph not being sufficient to obstruct its extremity, or to coagulate the blood in it with the requisite firmness. In the latter, the hæmorrhage is much more frequent, as these circumstances obtain much more generally, and to a greater extent in it, than in the former. — (*d*) *Ulceration* may follow either internal or external gangrene. In these cases, organisation of the coagulable lymph that is formed, or granulation, does not take place; but absorption of it with the tissue in which it is deposited proceeds gradually. It is owing to this, that perforation of hollow organs follows sphacelus. When the mortified part is retained, owing to its situation, or is not thrown off, it becomes macerated, or reduced to shreds, by the fluids poured out by the surrounding vessels. A partial absorption may occur in these cases, and, by contaminating the circulating fluids, terminate life in a short time, or place it in imminent danger. — In some instances, as introsusceptions, adhesions of the opposed margins of the living inflamed parts may take place, with perfect union, the sphacelated portion being evacuated. A dead part of the lung may also be thrown off by the bronchi.

15. When gangrene, in its earlier stage, is arrested, and terminates in restoration of the healthy state, the blood begins to move in the obstructed capillaries, and the circulation, especially at the circumference, becomes more and more active. The globules of the coagulated blood seem to separate, and to pass into the currents of the minute canals; sensibility gradually returns; and the colour of the part becomes less dark or livid. The temperature also rises; and the absorption of the effused fluid commences. At last, the size and firmness of the part, with all its functions, are restored.

16. ii. Gangrene from Local or General debility — *from Exhaustion of Organic Nervous Power.* — Depression of the organic nervous or vital influence is the chief pathological element or precursor of this form of gangrene, which, owing to this circumstance, is contingent on certain adynamic diseases, as typhoid fevers, scurvy, noma or gangrenous thrush, and other maladies attended by extreme asthenia. This variety is often preceded by increased sensibility, heat, and injection of the part. The last of these characteristics is the most common; and is frequently caused by pressure, as observed in the parts on which patients rest in bed, by friction, puncture, and the irritation of morbid secretions. The application of leeches, blisters, or the tartarised antimonial ointment to debilitated or cachectic children often produces it. But it occasionally appears, and proceeds rapidly, without any very manifest antecedent, or attendant, inflammatory action — certainly without increased action of a sthenic kind — particularly in very unhealthy children, and in persons affected by scurvy, or the low putro-adynamic states of fever. In these,

very slight causes will occasion engorgement of portions of the integuments, or of internal viscera, followed by the changes already described as constituting gangrene and sphacelus; and local congestions will sometimes occur and be followed by loss of vitality, without any obvious cause, or any obstruction to the circulation, or manifest increase of vascular action in the part; whatever action may appear being of an irritable, asthenic, or extremely weak kind. The gangrenous or asthenic form of *furunculi*, and the humid or phagedenic sores met with in the mouth, gums, cheeks, genitals, &c., of unhealthy children, are illustrations of this variety — the chief characteristics of which are, depressed organic nervous or vital power; imperfect or asthenic vascular action, both previous to, and attendant upon, the gangrenous lesion; and a poor or vitiated state of the circulating fluids. (See SCURVY; and THRUSH — *Gangrenous.*)

17. iii. GANGRENE FROM OBSTRUCTED CIRCULATION. — The *arteries* may be incapable of conveying blood to, and the *veins* of returning it from, a part. In the preceding varieties of gangrene, the organic nerves and capillaries are the primary and chief seats of the lesion. In this variety, they are consecutively affected, owing to the obstruction which causes it either cutting off their supply of blood, or preventing the return of it. — The changes which take place in either case are somewhat different, particularly as to the order of their procession. When the blood is sent in insufficient quantity to, or is entirely prevented from arriving at, an organ or part, the effect upon the nervous and vascular organisation of it must be such as to cause its atrophy or death; for the fluid requisite to nutrition and life is no longer supplied to it. But when the return of the blood is obstructed by lesions of venous trunks, or by tumours pressing upon them, or by disease of the heart, an undue accumulation of blood takes place in the capillaries and veins beneath the seat of obstruction; the blood stagnates more or less; the capillaries are distended beyond their powers of reaction, and their tonicity is exhausted; effusion supervenes in the more porous and yielding tissues; the organic nervous and vital power of the part, already impaired by the stagnation of the capillary circulation and the venous properties of the blood, are still further depressed by the progressive effusion and distension; and at last, if the obstruction become complete, the vital manifestations of both nerves and capillaries are entirely extinguished. The varieties which thus proceed from these different pathological states require separate notices.

18. *A. Gangrene from Obstruction of Arteries.*—A *ligature* placed around an arterial trunk, when the circulation is not supplied by collateral or anastomosing branches; the *rupture* of the internal and middle coats of an artery, occasioning obstruction of its canal; *inflammation*, followed by the accumulation of fibrinous lymph in its interior, and obliteration of the vessel; and osseous or fibrinous deposits in its coats or in its cavity; are the circumstances which give rise to this variety. — *a. Gangrene from rupture of the internal coats of an artery* has been described by Professors TURNER and CARSWELL. The rupture of these coats is obviously the result of previous disease. But, however produced, it is manifest that the lacerated part, with the lymph effused from it, will often prove a nucleus around which a fibrinous coagulum will form, and increase until the circulation in the vessel is entirely obstructed. The gangrene will be merely contingent upon this occurrence; for the coagulum may not entirely obstruct the vessel; or the obstruction may be complete, and yet the circulation may be carried on by collateral, or by enlarged anastomosing vessels. — An abstract of one of the cases detailed by Mr. TURNER will illustrate the progress of gangrene from this cause, as it agrees with one which I had an opportunity of seeing, and in which amputation was performed. About half an hour after rupture of the popliteal artery, no pulsation could be felt in any of the arteries of the foot, nor in the ham. The foot was cold. No pain was excited by pressure on any part of the limb; but cramp-like pains were felt in the calf of the leg. The following morning the foot was pale and cold, and the integuments below the ankle were entirely void of sensation, even when pinched or tickled. The muscles of the foot seemed to have lost their power of contraction. The next day, mottled purple patches appeared on the instep and fore-part of the ankle, and gradually extended over the whole foot, till the surface, by the fifth day, was entirely livid. With the progress of discolouration, the foot swelled slightly, became œdematous, and seemed somewhat warmer. On the seventh day, several tense, globular vesications appeared on the foot, some filled with reddish, and others with pellucid serum. They increased in number, and extended to the calf of the leg. About the ninth day, the soft parts above the ankle were livid, the discolouration proceeding upwards to the calf of the leg, and soon afterwards nearly to the knee. The soft parts adjoining the discoloured skin were swollen, and very painful on pressure, but no redness nor any inflammatory line between the gangrened and living parts appeared. The discoloured parts were completely insensible. The patient had been much reduced by his previous illness; but with the progress of the gangrene, weakness, tendency to faint, copious sweatings, quick and feeble pulse, became very prominent symptoms, which were followed by cough, laborious breathing, and death upon attempting to sit up in bed.—The coats of the artery were found, torn, thickened, and the canal filled by fibrine, lymph, and coagulated blood.

19. *b. Inflammation of the internal coats of an artery*, particularly of one or more considerable branches, is followed by effects similar to those just described; especially if the obstruction of their canals, by lymph and coagula, be complete. Gangrene from this cause has been noticed in the article on *Inflammation of* ARTERIES (§ 29.). It may occur in internal viscera, as well as in external parts, although the evidence of its existence in the former is not so complete as may be desired. The gangrene that sometimes attacks a portion of the lungs may probably arise from this cause, but there is no satisfactory proof of such being the case. It does not, however, appear unreasonable to infer that, in some constitutions and habits of body, inflammation may extend from the substance of the lungs to the blood-vessels themselves — arteries or veins — and that the inflamed part may

rapidly pass into gangrene, owing to the obstruction of the circulation in one or other of these vessels. — Of the occurrence of gangrene of a limb from inflammation originating in a large artery, there can be no doubt, as several instances of this kind are on record. In these cases, the consequent obstruction of the main trunk may be sometimes attended by a partial collateral circulation, which, although insufficient to preserve the vitality of the whole limb, yet may preserve that of a considerable part below the place where the vessel is obstructed. A case illustrating this fact is recorded in the *London Medical Repository*, vol. xviii. p. 119.

20. *c. Gangrene from fibrinous or osseous formations in arteries — Senile gangrene — Idiopathic, dry, or spontaneous gangrene.* — When these formations are so extensive as to prevent the circulation through the main arterial trunks of a limb, a different route is often not established; the diseased state of the smaller vessels, especially those in connection with the affected trunks, indisposing them to become the collateral channels of circulation.—When an arterial trunk is thus obliterated or obstructed, the gangrene generally commences with a dark brown, purple, or black spot in one or more of the toes, frequently without any previous swelling, or any increased heat or sensibility. Occasionally, a pricking or tingling sensation is felt in the discoloured toes, which are colder than natural, and often numb. The purple or black discolouration soon gains the whole of one or more toes. There is no increase of their size, but rather a diminution of it; and seldom pain on pressure. In some instances, however, increased temperature, sensibility, and bulk of the affected toes precede the changes just described. The discolouration proceeds gradually to all the toes, and thence over the back and sides of the foot. It sometimes extends as high as the knees; but death generally takes place before it reaches thus far. It is seldom preceded or attended by much swelling of the parts, which the gangrene successively invades; but there are occasionally seen a dark redness of the skin, with heat, pain, and slight puffiness or tumefaction. In many instances, particularly when the accession of the disease has been slow, the parts are even wasted before they are struck by gangrene; and, when this has been the case, they are afterwards shrunk, indurated, and dry. In more sudden and rapid attacks, where the obstruction is less complete than in these, Dr. Carswell justly remarks that considerable congestion is induced, with the effusion of more or less serosity, whereby the bulk of the foot, and, more frequently, of the leg, is augmented; but even in this case, the toes, the primary seat of the disease, are not increased in size. It is in the progress of the disease upwards that congestion or œdema occurs; that the skin becomes tense and painful; and that the febrile symptoms, if they have not yet appeared, supervene, increase rapidly, aggravate the local affection, and hasten death.

21. This form of gangrene seldom occurs before sixty, very rarely before fifty, and never in young persons. The obstructions found on dissection are ossification of the arteries of the affected limb, and often also of other parts of the body; and a fibrous tissue formed either in the coats or in the canals of the vessel. In these latter cases, the artery is sometimes converted into a solid or ligamentous cord. Occasionally ossific spiculæ or deposits project into the canal of an artery, solid fibrine having collected around them (see art. Arteries, § 63.). Instances of gangrene from disease of the arteries are recorded by Saviard, Hébréard, Andry, Chavalier, Begin, Hodgson, Cruveilhier, Avisard, Marjolin, Syme, and others, mentioned in the References of this article. Two cases of the disease from ossification together with obliteration of arteries have occurred in my own practice. It has been supposed, that ossification of the principal arteries of a limb, will of itself produce gangrene; but it will not have this effect unless some other cause of obstruction, as narrowing of the canal, fibrinous formations, &c., be conjoined with it. The appearances in my own cases, as well as in those recorded by the other writers referred to, demonstrate this fact. In some of those the obstruction was not limited to the arteries, but was seated also in the veins. In the one examined by M. Brulatour, the arteries above the seat of gangrene were partially ossified, their calibre diminished, and their channels filled by solid fibrinous deposits. The coats of the veins were thickened, and fibrinous coagula adhered to their internal surface. — The lesions of both arteries and veins were evidently the consequences of inflammatory action of a sub-acute or chronic kind.

22. *B. Gangrene from Obstruction of Veins.* — Gangrene may arise from this cause both in external and internal parts; but especially in the latter. — *a.* It rarely occurs in the former, as the veins are so numerous, even in the extremities, as to admit of a collateral circulation, although many of them may be obstructed. I had, however, an opportunity of attending a case with Mr. Davies (*Lond. Med. Repos.* vols. xxiii. p. 451., and xxiv. p. 51.), in which gangrene of the foot and great part of the leg took place, owing to interrupted circulation in the veins of the limb. On dissection, the femoral vein was found inflamed in the highest degree, and its coats thickened. It was full of coagulated blood. This state extended throughout the iliac vein into the cava, nearly as high as the diaphragm. All the small veins of the diseased limb seemed in a similar state.

23. *b.* Internal gangrene is often owing to pressure upon the veins, especially in cases of hernia and introsusception. But, in other instances, this cause is rather inferred than demonstrated. Dr. Carswell thinks that gangrene of portions of internal viscera, from the pressure of indurated tumours, is not uncommon, particularly in the lungs, liver, and intestines; but it seems to me, that the cause is seated as often within the veins, as external to them — that the obstruction frequently consists in obliteration of their canals, either from previous inflammation, or from coagula formed in them. This is evidently the chief cause of many cases of gangrene of a portion of the lungs; both veins and arteries running between, or in the vicinity of, excavations becoming obstructed, owing to the extension of the morbid action to them. But inflammation or obstruction, particularly of the veins, may have been induced by the transit of tubercular matter, or other morbid secretions, into them, which may either inflame their internal membrane, or coagulate the blood in them; the consequent obstruction causing

sphacelating ulcerations and cavities, or extending those which may have already commenced. In phthisis, attended by a very copious offensive expectoration, containing portions of softened cellular substance and tuberculous matter, or by a dirty brown, or greenish, or greyish sputum, with a gangrenous odour, the existence of one or other of these lesions may be inferred. — In cases of adventitious, cancerous, or other malignant formations, either the pressure of the tumour upon the adjoining veins, or the absorption of a portion of the morbid secretion, causing coagulation of the blood or other obstruction in the veins, sometimes gives rise to mortification of portions of the morbid mass, which may fall off in a state of gangrene or sphacelus.

24. In gangrene from intus-susception, the veins of the mesentery are pressed upon just at the points where the external and internal folds of the duplicature forming the invaginated portion of the intestine terminate superiorly. The consequence of this pressure or stricture is congestion of blood in the incarcerated part, and inflammation at the point of pressure or stricture. When the inflammation is attended by the exudation of coagulable lymph, the adhesion of the strangulating and strangulated portions, just at the point of stricture, is the result, and the latter portion is evacuated in a gangrenous or sphacelated state; and either in one, or in successive portions. When the part is only gangrenous, it generally still retains its form, and the coats may be easily traced in it after maceration. The diameter of the intestine frequently experiences no diminution at the point of separation and union; and recovery may be complete, although a very large portion of the bowel may be lost in this manner. (See art. COLIC, and ILEUS, § 38.)

25. C. *Gangrene from Disease of the Heart.* — It occurs principally in the lower extremities, contingently upon impeded circulation in the veins with effusion of serum into the cellular tissue. Its progress is often slow; but it may be rapid. It is always consequent upon œdema or anasarca of the limbs, scrotum, and labia pudendi. When gangrene is likely to appear, the previously white, tense, and shining skin, becomes mottled with dull red or purplish spots, owing to the congestion of congeries of cutaneous veins. To these succeed bullæ or phlyctenæ, from the effusion of serum under the cuticle. Upon the bursting of these, the skin underneath is dark brown or livid, and is soon converted into an ash grey slough. Increased pain and redness are sometimes present, and either precede or accompany the separation of the dead part. Previously to the injection of the cutis, the temperature of the limb is usually very low; but as this change takes place, and as sloughs form, both the heat and the sensibility of the part are considerably augmented. Febrile symptoms, as well as local inflammatory action of an asthenic kind, often appear, in various grades; and the disorganisation supervenes and extends with increased rapidity. The gangrene may attack several parts of a leg, or even both legs; but it very seldom appears in the feet or toes. It rarely implicates any other tissue than the cellular, always beginning in the more superficial parts of it. to which this lesion is chiefly confined. In addition to the interrupted circulation through the heart, the veins are inordinately pressed upon by the serum accumulated in the cellular areolæ between them and the stretched integuments; and the return of blood through them is thus further retarded. The distension, also, of the cellular tissue by the serum impairs the vital cohesion and power of resistance it previously possessed, and disposes it to experience a state of asthenic inflammatory action terminating rapidly either in gangrene or in some one of those sloughing abscesses described in the articles ABSCESS, and CELLULAR TISSUE.

26. iv. FROM LESION OF NERVES. — Gangrene has been supposed, by modern pathologists, to be sometimes occasioned by the loss of nervous influence, from injury or disease of the spinal cord, or of the nerves of a limb. TOMMASINI has even supposed that the inflammation of the nerves of a part is the cause of gangrene in all cases of acute inflammation terminating in this manner. But, we have no proofs of the accuracy of these views. Indeed, facts militate against them. There are numerous instances of the loss of the cerebro-spinal nervous influence of a limb, without much detriment to the functions of circulation, nutrition, and animal heat in it, when it has not been subjected to pressure. These functions are entirely dependent, as I have shown many years ago (*Lond. Med. Repos.* May, 1822), upon the supply of the organic or ganglial nerves to the arteries, and are but slightly influenced by the cerebro-spinal nerves of the limb. Besides, many cases of inflammation of nerves have been observed, but gangrene has been very rarely seen to supervene, and even then, it has arisen from the extension of the inflammation to adjoining parts, more particularly to the blood-vessels. Phlebitis, and even artereitis, especially the former, are most prone to occur in females soon after childbirth; and the great majority of the cases of these diseases I have seen were consequent upon flooding. A similar cause is influential in the production of neuritis; and I have witnessed instances, where the affection of the limb was evidently this latter at the commencement, but complicated with disease of the blood-vessels in an advanced stage. One of these occurred in the practice of Mr. JOHN DAVIES, and was seen by me several times. In it gangrene came on; the limb was amputated by this very able practitioner; and the extent of lesion ascertained upon examination after death. M. DUGÉS (*Rév. Méd.* t. iii. 1824, p. 177.) mentions a case of neuritis, in a female, after parturition, complicated with flooding. The upper portion of the sciatic nerve was the seat of the disease; and the parts in the immediate vicinity soon become livid and œdematous. The dissection demonstrated inflammation of the nerve and gangrene of the adjoining tissues. A similar case is adduced by M. MARTINET (*Rév. Méd.* Juin, 1824). In it, besides distinct marks of inflammation of the superior part of the sciatic nerve, gangrene of the adjoining structures was observed after death. to a considerable extent below the diseased portion of nerve; the affection of the nerve having been anterior to the gangrenous alteration.

27. v. GANGRENE FROM VARIOUS PHYSICAL AGENTS. — (*a*) Severe contusions, or other local injuries — (*b*) powerful stimulants or irritants, or other chemical agents — and (*c*) excessive heat or cold — either directly or indirectly cause the

death of the parts on which they act. — *A.* The *first* of these falls within the province of the surgeon. It may, therefore, be only remarked that, when the injury is very severe, nervous influence and circulation may be so entirely annihilated as to prevent the return of action, and to cause the immediate death of the part. Contusions from spent shot &c. are often followed by this effect. But when the injury is less violent, the capillaries of the part have their tonicity impaired, and become congested; reaction of the larger vessels supervenes, owing to the consequent obstacle to the circulation, and to the effects of the injury on the adjoining parts, and increases the congestion of the capillaries; and the effect of this reaction, upon the injured and congested capillaries, is to exhaust their remaining vital endowment, and to produce gangrene of the part. In these cases, the surrounding tissues are inflamed; a separation of the gangrened portion takes place, as soon as its vitality is altogether extinguished, and as the lymph effused by the inflamed capillaries limits the extension of the lesion; and the whole phenomena are the same as in sphacelus from very acute inflammation.

28. *B.* Powerful *stimulants, irritants,* and *chemical agents,* produce gangrene somewhat differently, according to their modes of action on the living tissues. — Stimulants act more especially upon the nervous endowments of the part, and, by excessive excitation, exhaust them; but they cannot induce gangrene unless they destroy the vital properties of the capillaries; and they can effect this only by previously causing intense inflammatory action, the consequent gangrene being the effect rather of this action than of the stimuli which excited it, although the frequency, and, indeed, certainty, with which the result will follow the cause will much depend upon the kind of stimulus. Thus, both liquor ammoniæ and spirits of turpentine will inflame the parts to which they are employed; but inflammation produced by the former will often pass into gangrene, and that caused by the latter will very rarely terminate in this manner. —The same remarks apply to irritants. These act more directly upon the capillaries, the gangrene being always a consequence of inflammatory action, in some one or other of its states, produced by them. Chemical agents, according to their nature, are often more complex in their operation; some of them both exciting the vital actions, and altering the intimate organisation of the part. Acids, alkalies, various neutral salts, both mineral and alkaline, &c. excite, and soon exhaust or extinguish, the vital properties of the parts with which they come in contact, with a rapidity, and to an extent, according to their concentration or activity. When much concentrated, especially alkalies and acids, they destroy the organisation of the part before its vital properties fully evince the effects produced upon them; the surrounding tissues, however, becoming inflamed, in consequence of the injury inflicted, and of the interruption of the circulation at the point where the obstruction of the vessels by the action of these agents commences. Alkalies produce gangrene very differently from acids. The former soften, dissolve, and combine with the ultimate organisation of the part, and render its fluids still more fluid; the latter constringes, corrugates, and condenses the structure, and coagulates the fluids in it. Both ultimately destroy the intimate constitution of the solids and fluids, and thereby annihilate the properties or functions resulting therefrom; but in the different ways just stated. The surrounding parts become inflamed owing to the obstruction at the limits of disorganisation; the vascular action varying somewhat in degree, and perhaps also in kind, with the nature of the agent, the extent of injury, and the circumstances proper to the individual. — When sphacelation results — for sphacelation is the effect rather than gangrene, particularly when these agents are concentrated — the colour varies according to the agent and quantity of blood in the part on which it has acted. A lighter colour of the dead part is produced by alkalies than by acids; a dark brown or black hue following the latter, particularly when applied in a concentrated state to mucous or vascular tissues. Alkalies generally produce a greyish, yellowish grey, or ash colour of the parts which they destroy.

29. *C. Gangrene from Extremes of Temperature.* — *a. Excessive heat,* if it be no greater than 220° or 230°, vesicates the part, and produces gangrene by the inordinate excitement of the nerves of the part, and the consequent vascular action. Higher grades of heat excite the nerves and capillaries still more intensely, and exhaust their vital properties with greater rapidity, the contingent sphacelus appearing more quickly and extending more deeply. In proportion as the temperature is increased, so is the consequent gangrene more entirely the result of the operation of heat, and less the effect of inflammatory action; the higher grades annihilating the vital properties, as well as destroying the structure of the part before reaction can take place in it. But, in most instances, unless death follow in a very short time, inflammatory injection and reaction in the surrounding tissues appear, and increase the extent of the gangrene and of the consequent sphacelus. — When the injury is not such as to occasion death in two or three days, the sphacelated part is separated from the living, and an abundant suppuration takes place from the living inflamed surface; but this seldom occurs in less than five or six days. The loss of substance is generally only partially repaired; a fibro-cellular tissue being formed, which contracts as it becomes more fully organised, occasions deformity, and interrupts the functions of the part.

30. *b. Intense cold* acts very differently from excessive heat in the production of gangrene. It affects chiefly the vital functions of the organ, and does not occasion disorganisation although it causes congelation of the fluids and soft structures. Gangrene seldom follows a diminution of temperature short of producing congelation, unless as a consequence of the inflammation intermediately occasioned. When the cold is great, the parts exposed to it, especially those furthest removed from the centre of circulation, have their vascularity diminished, and become pale, constricted, and numb. Motion and sensibility are afterwards lost, and the parts are even frozen in the more extreme cases. If the exposure to the cold continues, the congelation advances; the functions sink progressively, and a state of apathetic lethargy comes on, terminating in unconsciousness and death (see art. Cold). In this case, gangrene

is not developed. It is not until the frozen part is thawed, or exposed to heat, that gangrene is manifested. The vitality, reduced or extinguished by the diminution of temperature, cannot be restored in all the affected tissues. The blood becomes again fluid, but it has lost its crasis, and separates into serum and coagulum in the smaller vessels. Sensibility, motion, and animal life do not return. The skin covering the part assumes a livid or brownish red colour; phlyctenæ appear on its surface; with grey, purplish, or black spots, indicating the passage of the gangrene into sphacelus. The living parts closely adjoining the gangrene are now injected and inflamed; the vascular reaction which they experience exhausting the remaining vital properties, especially of the capillaries, and extending the mortification, as in gangrene from inflammation. In slight cases, although congelation may have taken place, the circulation and sensibility of the part is often restored; a tingling or pricking sensation is felt; reaction supervenes, and even becomes excessive; and, owing to previous reduction of vital power, and the consecutive action, exhaustion of the affected structure, followed by lost power of the capillaries, diminished cohesion of the tissues, coagulation or other change of the blood in them, and by gangrene, soon afterwards appears. In these cases, the external changes are altogether similar to those just described; but the extent of mortification depends upon the constitution of the patient, and the violence of the antecedent and attendant inflammation.

31. vi. GANGRENE FROM POISONS. — The poisonous substances to which attention will be here directed, are — 1st. Diseased vegetable productions; 2d. Diseased or decomposed animal matters; and, 3d. The poisons generated by certain animals. — *A. Gangrene from Diseased Grain* is sometimes seen among those who live chiefly on rye. Of the general effects of this and of other grains, when used in a diseased, unripe, injured, or mouldy state, some notice is taken in the article ERGOTISM. But the influence of *spurred rye* in causing gangrene requires a particular notice at this place. *Spurred rye*, when used with the sound grain as food, produces, according to the quantity, somewhat different effects — either *convulsive* ergotism, or *gangrenous* ergotism. But both these species of disorder may be associated, or the former may be followed by the latter, either of them existing in various grades. Indeed, the gangrenous disease is generally preceded, or even attended, by some degree of spasmodic affection.

32. *A. Gangrenous Ergotism — Necrosis ustalaginea*, SAUVAGES — *Gangrène des Solognois* — has been observed both sporadically and epidemically. It has been supposed that the epidemics which appeared in various parts of Europe during the middle ages, and were denominated *Ignis Sacer*, *Saint Anthony's Fire*, *Mal des Ardens*, &c., were occurrences of this variety of ergotism in a severe as well as epidemic form. The gangrene and separation of the limbs mentioned with respect to them countenance this supposition. It was not, however, until the epidemic of Hesse, in 1596, that the effects of spurred rye on the œconomy were fully recognised by physicians. In 1630, an epidemic gangrene appeared in Sologne, and was traced to this cause by THUILLIER. Subsequent occurrences of this malady, in different parts of France, Switzerland, and Germany, have been described in connection with this cause, by PERRAULT, DODART, BRUNNER, NOËL, LANG, DUHAMEL, SALERNE, READ, and others. — The experiments performed by TIESSIER in 1780, and the facts detailed by IANSON in 1818, have further elucidated this subject.

33. Gangrenous disease from the use of spurred rye generally commences with vertigo, faintness, diminished sensibility, and slight convulsive or spasmodic movements — with the chief symptoms of spasmodic ergotism. But it is sometimes not preceded by any of these. In this case, it is ushered in by lassitude and weakness of the lower extremities, with deep-seated pain, increased by heat, and aggravated during night. There are occasionally, at this period, slight swelling, but without redness; and, in some instances, even a wasting of the extremities. The temperature, motions, and sensibility, of the parts are afterwards lost, although the deep-seated pain still continues. The integuments now become wrinkled from the shrinking of the parts contained by them. Phlyctenæ appear on the surface; the skin assumes a violet, livid, or black hue — not, however, in all the places affected, but first in the heel, feet, or various parts of the thighs or legs. Sometimes the gangrene extends from the upper portions of the limbs to their extremities; or from the more internal structures to the integuments; and in other cases it proceeds from the toes upwards. When it reaches the trunk, and often before it advances so far, the patient sinks. It generally proceeds gradually, and is not limited to the lower extremities, the upper being often affected. When it is arrested, an inflammatory circle forms around the dead part; and, at the points of separation, an abundant and very fœtid suppuration is established. — The gangrened portions are dry, hard, and shrunk. A whole limb may be thrown off in this state without the loss of a drop of blood.

34. Gangrenous ergotism seems, from the early effect produced by its cause upon the nervous system — from the spasmodic contractions, insensibility, weakness of mind, and fatuity, often accompanying it — to arise, in a great measure, from lesion of this system. The circulating fluids are evidently also deteriorated; the affection of the nervous system being probably caused by the change in the blood. Whatever that change is, it may be supposed to affect also the blood-vessels, particularly those most removed from the centre of the circulation. But the vessels, as well as the internal viscera of persons who have died of this disease, have not been investigated. In this state of ignorance as to the morbid appearances after death, several opinions have been hazarded as to the nature of the alterations which terminate in this manner. Some suppose that inflammation of the blood-vessels is produced; and others contend that the existence of inflammatory action is not indicated by the descriptions given by observers of the disease. Without the data furnished by the minute examination of the blood-vessels and nerves after death, all speculation as to the nature of the disease must be inconclusive.

35. *B. Gangrene from Diseased or Decomposed Animal Matters.* — Mortification may take place

from these causes in one or other of the following circumstances: — 1st. It may result from the absorption of gangrenous or morbid matter from a different part of the same frame; in which case the consecutive gangrene is generally seated in some internal organ, as the lungs, spleen, liver, &c. — 2d. It may follow the application of putrid or diseased matter to an abraded surface, or by puncture, as in dissection, wounds, &c. — 3d. It may be occasioned by exposure of a wound or sore to foul air; or by the constitutional affection produced by the respiration of air loaded with decomposed animal matter, as in hospital gangrene: — and, 4th. It may follow the contact of a diseased secretion, either with or without abrasion of the cuticle. I shall consider separately gangrene occurring in each of these ways.

36. *a.* When mortification follows compound or other fractures, or amputations, inflammation, &c., a similar occurrence to that which I have noticed, when treating of abscesses (see art. Abscess, § 27.), may take place — a portion of the sanious fluid may be carried into the blood, and give rise to internal gangrene, without any appearance of previous inflammation of the consecutively gangrened part. — Upon examination after death, this part is found in some instances livid, brown, or black, in one or more circumscribed portions, and somewhat condensed, particularly if the lungs be the organ thus consecutively altered; and in others of a dirty grey or slate colour, and soft or pulpy. Occasionally this latter state appears to have been the advanced stage of the former. — In several cases, the diseased part is reduced to a sanious, or almost fluid condition; and changed to a reddish brown, or dark brown colour. In all these states, the surrounding tissues may not be at all changed; the gangrened portions varying in size and in number. — In these cases, the sanious matter, which has passed into the circulation, has induced congestion of a portion of an internal parenchymatous organ, and so impaired the vital properties of the congested capillaries, as well as of the organ itself, as to cause them to pass directly into a state of gangrene, without intermediate reaction of the vessels, either in the affected part or in the surrounding structures. The above states of *consecutive gangrene*, I have seen after sphacelation affecting the extremities, or parts pressed upon in low fevers, especially those covering the sacrum.

37. *b.* The application of putrid or morbid matter to an abraded or punctured part often produces a septic or contaminating effect, especially upon cachectic or previously disordered constitutions. Putrid vegetable or animal substances, and various morbid secretions, when thus applied, may occasion, in the first instance, erysipelas, or diffusive inflammation of the cellular tissue, quickly passing into gangrene. The wounds received in dissections, particularly of stale subjects, or of bodies dead more than twenty-four or thirty hours, are sometimes followed by gangrenous inflammation of the cellular tissue, attended by irritative or low fever. The disease, caused by wounds or punctures received in the examination of recently dead bodies, particularly those who have died in the puerperal state, or from inflammation of serous membranes, although much more dangerous than that which occurs in the foregoing circumstances, is seldom attended by gangrene even in fatal cases (see Poisons—*Animal*); or if it be, this lesion is the least important part of the malady.

38. *c.* Wounds, injuries, and sores are not infrequently affected by gangrene in circumstances favourable to the contamination of the air, to imperfect ventilation, and to the production of humidity, in the apartments where persons thus injured are confined. — *Hospital gangrene* is most frequently generated in this manner; for, although the fluids of the diseased part will produce it, when they come in contact with an abraded surface, or possibly, even, when they are for any time applied to the sound skin, yet I believe that it is chiefly owing to the solution of putrid animal miasms, in the humidity of the surrounding air, that the disease is communicated in the wards of an hospital. Hence the mischief of wetting the floors of wards too often, when numbers are confined in them with injuries, &c., as respects the production both of erysipelas and of gangrene. — I am of opinion, that the close and foul air generated by the discharges from suppurating or gangrenous surfaces, will favour the production of gangrene, in injured parts, by lowering vital power and deteriorating the circulating fluids; and thereby inducing a state of system similar to that in which putro-adynamic fever originates, or by which it is characterised.

39. When *hospital gangrene* commences in a sore or part with which the foul air comes in contact, it is evinced by a change of colour, which, however, differs in different cases. In some, it begins with a certain degree of pallor, and the exudation of a dirty, pale grey matter, occasionally interspersed with specks of blood. In other instances, it presents a livid hue; and, in nearly all, it is swollen and painful. The surrounding parts soon undergo similar changes: the integuments have an erysipelatous appearance, and, with the subjacent cellular tissue, are soon converted into spongy, dirty grey sloughs. The separation of the sphacelated parts is generally attended by an exudation of blood, or by more copious hæmorrhages, owing to the adynamic state of constitution preventing the inflamed part from forming coagulable lymph, whereby the extension of the gangrene may be limited, and the hæmorrhage prevented. The state of asthenia or putro-adynamia, produced by the causes just named (§ 38.), favour the extension of the mortification, the further contamination of the blood and the recurrence of hæmorrhage. When a considerable vessel is destroyed, the absence of coagulable lymph gives rise to losses of blood, which further sink the patient; and a recourse to the tourniquet, in order to arrest the bleeding until the vessel is tied, accelerates the death of the limb, which soon becomes swollen, completely sphacelated, and intolerably offensive.*

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* Mr. Copland Hutchison, in a most instructive chapter on Hospital Gangrene, in his *Surgical Observations*, details a case of a man, who had been the subject of extensive exfoliation of the left parietal bone, exposing the *dura mater* to the extent of two square inches and a half, and who was infected by hospital gangrene of the exposed part. In about three days the *dura mater* was destroyed, and the brain itself attacked. The brain came away, broken down in its structure, as if it had been mixed with dark-coloured vinegar, and emitted a disagreeable sour gangrenous smell. The man lost half a tea-cupful of brain before fever and delirium came on. He died on the

40. *d*. The morbid fluids and secretions of several of the lower animals often produce very serious effects when applied to the denuded surface, or even to the sound skin; and these effects are generally attended or followed by gangrene of the part with which they come in contact. The occurrence of *Malignant* PUSTULE (see the article) is an illustration of this fact. The application of the blood or raw flesh of a diseased animal to a part will often occasion gangrenous inflammation of it, although the flesh of these animals may be eaten with impunity when cooked. Of this, various instances have been adduced by MORAND, DUPUY, LEURET, HAMONT, and others. I believe that, in all cases of the production of gangrene by morbid secretions and other fluids — whether of the lower animals or of man—the local as well as the constitutional effects produced by them are most virulent, when they either proceed directly from the living animal, or act very soon after death; and that they are less injurious when they have undergone the changes constituting incipient putridity or decomposition.

41. *C. Gangrene from poisons generated in healthy animals*, as in the viper, rattlesnake, &c., commences and proceeds with amazing rapidity, upon insertion of the poison, and with remarkable depression of the vital manifestations of the constitution, as well as of the part thus inoculated. The insertion of the poison induces intense pain, which rapidly extends; swelling and hardness of the cellular tissue; dark redness at the point of injury, soon followed by a spreading livid discolouration; and diminution of temperature. — The skin is rapidly covered by phlyctenæ; the cellular tissue becomes soft, and crepitates on pressure; and the puncture discharges an offensive sanious fluid. Almost immediately upon inoculation of the poison, and co-ordinately with the rapidity and extent of the local action, an intense effect is produced upon the whole frame (§ 50.).

42. II. OF THE CONSTITUTIONAL SYMPTOMS OF GANGRENE. — The states of vital manifestation throughout the system, vary somewhat in each of the forms and circumstances, in which gangrene and sphacelus appear. I shall, therefore, take a very brief view of those which are usually seen in most intimate union with each of these forms.—*A. Mortification from inflammation* presents no uniform relation to the severity of the local action, or of the sympathetic constitutional disturbance, although such relation obtains in a general way. — Inflammation of much intensity, in a constitution previously debilitated, or in a habit of body already cachectic, or during a deteriorated state of the circulating fluids, is always more or less liable to terminate in gangrene. Its occurrence also, in a highly sanguine, irritable, and plethoric state of the system, particularly when this state has been induced by living highly, or by the excessive use of intoxicating liquors, is a no less unfavourable circumstance; and, equally with the foregoing liabilities, should be taken into account when symptoms indicative of this termination appear. In the former class of occasions, in which gangrene may occur, the inflammation, although slight or limited, may nevertheless be excessive, relatively to the state of vital power and of resistance to injurious impressions or actions: in the latter, there is always a disposition to intensity of action so great as to quickly exhaust the vital properties of the vessels; if this intensity be not promptly reduced, and the consequent exhaustion either anticipated or promptly met by local or general means appropriate to the peculiarities of the case.

43. To detect the commencement of gangrene in any internal viscus is by no means so easy as it has been represented by many writers, who, merely copying or compiling from one another, have thereby often perpetuated error. The *sudden sinking*, so often insisted upon, attends various other pathological conditions besides gangrene; and, even when it is observed in connection with this lesion, it may be the attendant of that change in the state of vital power, of which gangrene is only one of the remote consequences.—When this symptom appears somewhat suddenly, it indicates one or more of three states; — *α*. It may depend upon the depression of organic nervous power, generally as well as locally; — *β*. It may arise from commencing gangrene; — *γ*. And it may be caused by the passage of morbid or putrid matter into the blood. The *pulse* varies on the accession of gangrene, with the previous grade of local action and of attendant fever. When action has been very high, the pulse retains its frequency, but becomes weak, small, soft, and very compressible, and ultimately irregular, intermittent, or even slow, just before death. When there has been but little previous fever, the pulse is very feeble, undulating, unequal, intermittent, and slow; but it is readily affected, in either case, by mental or physical impressions. The *animal heat* sinks rapidly with the pulse when gangrene supervenes; the extremities becoming cold, and the surface covered with a clammy perspiration or sweat, which is cold and raw as dissolution draws near. If the antecedent symptomatic fever have been slight, the *mind* may be undisturbed to the very last; if severe, delirium, picking at the bed-clothes, stupor, coma; accumulations of mucous sordes on the tongue, teeth, and lips; fœtor of the breath, and even of the body; and unconscious evacuations, for a longer or shorter time before death, are not infrequent.

44. Besides these, various other symptoms appear, but without any uniformity or constancy. These are, faintness or syncope, particularly when the head is raised; hiccup; vomitings, sometimes without severe retchings, or a passive rejection of matters from the stomach; a peculiar gangrenous odour exhaled from the body, and from the excretions; a sunk, collapsed, pinched, and cold state of the features; a dusky, lurid, and sometimes a jaundiced, appearance of the skin; tympanitic distension of the abdomen; offensive eructations; an emphysematous state of parts; wandering delirium, especially at night, or various passing delusions; tremblings or shudderings; and restlessness, or laborious hurried respiration. An offensive gangrenous odour of the expired air is very remarkable when gangrene occurs in the lungs; but it may accompany this lesion in any other part, if a portion of the morbid or decomposed matters pass into the circulation. In this case, all the excretions — pulmonary, cutaneous,

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10th day from the attack of the gangrene. The whole of Mr. C. HUTCHISON's observations on this disease are results of most extensive experience, and are very interesting.

intestinal, and urinary — will be rendered more or less offensive, and they may even exhale a gangrenous or putrid fœtor.

45. *B.* In *mortification from debility*, or from *deficient or unwholesome food*, not only are the vital manifestations generally impaired, but the fluids and solids also are frequently in a state of obvious disease, before gangrene occurs, particularly in low fevers, scurvy, &c. In such cases, the general adynamia, as well as the deterioration of the fluids and solids, are rapidly augmented with the accession of this lesion, and most of the symptoms already noticed are also superadded. The pulse, temperature, and mental powers are affected in the manner just described. The previous and attendant asthenia, and the consequent alterations in the blood — which is incapable of coagulating, as it escapes from the diseased part — favour the recurrence of hæmorrhage, the extension of sphacelation, and the further contamination of the fluids from the transit of putrid matters into the circulation, by preventing the formation of coagulable lymph. The more obvious effects of these states are, accelerated sinking of the vital functions, offensive diarrhœa, and various other contingent phenomena, mentioned above (§ 44.), as indicating approaching dissolution. — When *inflammation of the nerves* seems connected with the production of gangrene, great pain, high irritative fever, watchfulness, &c. precede the sinking, irritability of stomach, and weakness or irregularity of pulse, attendant upon this change.

46. *C.* When *obstructed circulation in the arteries* occasions gangrene, the symptoms depend very much upon the cause of obstruction. — *a.* If *acute artereitis* (see ARTERIES, § 27. *et seq.*) produce it, severe inflammatory or irritative fever precedes it, and, on the accession of it, changes into fever of a lower type; watchfulness, sometimes delirium, and most of the symptoms already noticed, supervening. — *b.* When *ligature or rupture of an artery* causes gangrene, the constitutional affection is not severe at first; but in two or three days, or in a shorter time, fever of a low type appears, with more or less disturbance of the nervous system, occasionally with delirium, discolouration of the general surface, and sinking of the vital powers, until either dissolution follows, or restoration and separation of the gangrened part takes place. — *c.* In cases of gangrene from *ossification and obstruction of the arteries*, the constitutional symptoms increase slowly until they ultimately indicate great prostration of the vital powers. In some instances, the progress is at first slow, and afterwards very rapid. In an early stage of the gangrene, slight irritative fever is sometimes observed; but discolouration of the surface, diarrhœa, sinking, hiccup, irritability of stomach, and the other usual attendants on sphacelation, afterwards appear; the progress of the constitutional affection being seldom arrested, or the separation of the dead parts effected.

47. *d.* Whatever peculiarity *gangrene from obstruction of the veins* presents as to the constitutional symptoms, belongs entirely to the nature of the obstruction. — If inflammation of the veins have occasioned it, the symptoms, local and general, of phlebitis will have preceded it, and the advanced phenomena will not differ from gangrene consequent upon internal inflammations, excepting that the powers of life will be more disposed to rally, and to separate the dead from the living parts. — Gangrene caused by *pressure upon the veins*, often takes place without any previous or attendant febrile action; the vital depression and other symptoms of this lesion supervening upon the congestion, serous infiltration, &c. more immediately produced by the obstruction. — *e. Internal strangulations*, however, and *intus-susceptions* of a portion of the intestinal canal, give rise to a different train of symptoms. In these, the pressure acts also upon the nerves and arteries; and the exquisite pain and tenderness, irritative fever, restlessness, and vomitings, followed by cessation of pain, by singultus, eructations, faintness, cold sweats, extreme weakness of pulse, &c., indicate the accession of gangrene. — *f. Interrupted circulation through the heart*, occasioning gangrene, is not preceded by febrile symptoms: the constitutional changes in this variety at first depend upon the disease of the heart, and become subsequently associated with those arising from impeded circulation of blood in the veins, serous infiltration, and the consequent pressure and gangrene. The progress of the local and constitutional affection is slow, but sometimes rapid at an advanced stage.

48. *D.* — *a.* The *action of heat* upon the constitution in producing gangrene, is proportioned to the violence and extent of local injury. — Excessive burning pain, hard pulse, thirst, and the usual attendants upon symptomatic inflammatory fever, follow the less violent injuries from this cause, heighten the local inflammation, and exhaust the vitality of the affected vessels. When gangrene is about to occur, or has supervened, the fever changes to the nervous form, often with delirium or mental agitation, followed by stupor, or convulsions when children are the subjects of this injury. In very severe burns, or where a very large surface has been scalded, these latter symptoms immediately follow the shock sustained by the constitution, from the extensive local injury inflicted; and often terminate fatally in a period varying from a few hours to two or three days. The severity and character of the constitutional affection, however, vary with the state of the patient and the situation of the injury. When the injury is over the great cavities, its effect is much more severe, *cæteris paribus*, than on the extremities.

49. *b. Gangrene from cold* is often attended by very slight constitutional disorder, when only the extremities have been exposed or affected, or when the cause has been removed soon after these parts had become benumbed or frozen. But when the whole body has been exposed to cold, particularly in a state of repose, or when the exposure has continued long after these effects have been produced, lethargy, stupor, insensibility, frequently passing into death, generally supervene in succession. It is when local inflammation or reaction appears, in the previously benumbed or frozen part, or in the living tissues adjoining, that fever takes place. But as soon as the inflamed part becomes gangrenous, the fever assumes the nervous character. In this variety, however, as well as in that from burns, the degree of consequent adynamia depends very much upon the previous state of the patient, physically and morally; upon the severity of the injury; and upon the extent

of the gangrene, and the rapidity of its accession and extension. Where want, improper food, and intemperance have already produced their effects on the frame, the constitutional commotion attendant upon the injuries produced by the extremes of temperature, generally presents more of a nervous character throughout, than in other circumstances, with a rapid, small, weak and irregular pulse; and frequently with tremor, delirium, or even both, or with more or less agitation. — *c. Chemical agents* affect the system chiefly by the inflammation they excite in the part to which they are applied; unless the injury is extensive or violent, when the symptomatic effects will nearly resemble those caused by extensive burns (§ 48.).

50. *E. Gangrene from poisons* is always preceded and attended by severe constitutional affection. — *a.* That occasioned by *spurred rye* is generally preceded by lassitude, faintness, weakness of the senses, vertigo, spasms, and symptoms of general adynamia, manifested both in the vital and animal functions. Sleep is prevented, by the severe pains in the limbs. The powers of mind are generally impaired; and, with the appearance of gangrene in the extremities, all these symptoms are increased, until the patient sinks into insensibility, or dies in a state of syncope. — *b. Gangrene from putrid or diseased animal matters* is preceded, as well as attended, by the severe constitutional effects, described in the articles on *Diffuse Inflammation of the* CELLULAR TISSUE, ERYSIPELAS, *Malignant* PUSTULE — either of which may be produced by these matters — and more fully elucidated in those on *Putro-adynamic* FEVER, and *Animal* POISONS.

51. *c. Hospital gangrene* is always attended by adynamic fever; and, in the circumstances alluded to above (§ 38.), it is often preceded by more or less depression of nervous and vital power, although rarely by prominent febrile symptoms. Derangement of the digestive functions, sometimes diarrhœa, a quick and feeble pulse, and physical and mental depression, generally usher in, and attend, the early progress of this gangrene. Dr. HENNEN states, that men who had borne amputation without a groan, shrunk at the washing of their sores, shuddered at the sight of a dead comrade, and even predicted their own dissolution, sinking into sullen despair. Towards a fatal close, prostration of all the vital manifestations, faintings, diarrhœa, vomiting, hiccup, delirium, discolouration of the general surface, insensibility, coma, cold clammy sweats, involuntary evacuations, &c. successively appear.

52. *d.* The *poisons of reptiles* occasion a sense of sinking at the epigastrium, oppression in the præcordia, laborious breathing, vertigo; pains in various parts of the body, particularly in the stomach, bowels and head; vomitings, diarrhœa; impaired vision and sensation; with a small, feeble or intermittent pulse. To these succeed, extreme sinking and anxiety at the epigastrium and præcordia, great thirst, syncope, singultus, offensive fœtid breath, a jaundiced or sallow state of the skin, coldness of the extremities and of the general surface, clammy sweats, insensibility, and death, unless the progress of vital depression be arrested by the most energetic means.

53. III. PROGNOSIS.—The prognosis, although generally unfavourable, varies with the different circumstances in which gangrene presents itself; and the extent to which it has proceeded. — *a. Gangrene consequent upon inflammatory action* is commonly fatal when an internal organ is affected, especially when the general excitement suddenly subsides, the pulse becoming quickly feeble, small, or thready; the features pinched or collapsed; the surface lurid, sallow, or livid; the respiration laborious or difficult; and the perspiration or other excretions fœtid and gangrenous. Singultus, rejection of the contents of the stomach without effort, syncope, and involuntary evacuations, are indications of the near approach of dissolution. But all these phenomena are often manifestations merely of that state of local and general derangement, of which gangrene is the immediate result, rather than of gangrene itself — at least of gangrene to any extent; for dissolution may take place before this lesion is fully developed. — When this form of grangene is external, its extent is less an indication of danger, than the character of the constitutional disorder, and the disposition evinced by this lesion to extend. — In all cases, the habit of body, the age, modes of living and previous health of the patient, and the exciting cause and character of the previous inflammation, should be taken into account. If these are favourable, if vital action be not very depressed, and if a disposition to form coagulable lymph and to arrest the disease appear, recovery may be expected.

54. *b. Gangrene from debility*, from *disease of the nerves*, and from *obstructions of the arteries or of the veins*, should receive a guarded, if not always an unfavourable, prognosis; for, in these circumstances, although some cases may recover, the great majority will terminate fatally. When it occurs from *ossification and obstruction of the arteries*, or from *disease of the heart*, a fatal result will surely follow; although it may be deferred for some time, in a few instances. — *c.* When it is produced by any of the more common *physical agents* noticed above, a much more favourable event may be anticipated, unless the intensity of the cause, and the extent to which it has acted, have given a very severe shock to the system, have depressed vital power beyond the ability of resistance, and induced low nervous fever with cerebral affection.

55. *d. Gangrene from the use of spurred rye* requires a cautious opinion as to the result; for when the disease produced by this agent has given rise to this alteration, matters will frequently have gone too far to admit even of amelioration.— Nor is the prognosis very different, when the deleterious effects of any of the *animal poisons* mentioned above have become so manifest as to be attended by gangrene. The most energetic means alone can then arrest the progress to dissolution; and these may be rejected from the stomach, or fail, even when retained, of rallying the powers of life. In every circumstance in which gangrene occurs, irritability of the stomach is a most dangerous symptom. — In *hospital gangrene,* however, removal of the patient to a pure air, and an appropriate treatment, at an early stage of the disease, will be attended by success, in the majority of cases.

56. *e.* Of all the circumstances that should be

taken into consideration, in forming a prognosis, none is of greater importance than the disposition evinced by the surrounding parts to limit the extension of the gangrene by the formation of coagulable lymph. This should be viewed as a most favourable occurrence, particularly when the local alteration has not proceeded very far, nor depended upon disease of the heart, as it indicates restoration of vital power, and consequent vascular reaction, whereby the injury may be arrested and partially repaired.—On the contrary, spreading of the gangrene is most unfavourable—1st. As producing a greater extent of exposed surface and of injury by which the constitution will be injuriously impressed; — 2d. As arising from progressive sinking of vital power; — and, 3d. As favouring the passage of a portion of the dead or morbid matters of the sphacelated part into the circulation, and the consequent contamination of the whole frame, — circumstances exerting a most powerful influence in hastening a fatal result, especially if asthenic inflammation, general adynamia, or an animal poison, have occasioned the gangrene.

57. IV. TREATMENT.—i. The means of cure in gangrene refer — *first*, to the removal of the pathological condition which occasions it; *secondly*, to the state of vital action in the vicinity of the dead part; and, *thirdly*, to the state of constitutional disturbance. — *A*. If gangrene have been caused by *inflammation*, especially if it have proceeded to sphacelation, the state of constitutional power will then have become so far impaired after the more sthenic forms of inflammatory action, and so much the more reduced after the asthenic, as to require a very different mode of treatment from that which would have been quite appropriate, before the gangrene had taken place.—*a*. Although the part is about to pass, or has just passed, into gangrene, after the more sthenic states of inflammation, *bloodletting* may still be practised, but with caution, particularly in robust or plethoric persons, or when the pulse still continues hard or strong, or when the gangrene is external. In these circumstances, excessive vascular action, if not subdued by a moderate depletion, would exhaust the remaining power of the vessels of the part or of the surrounding tissues; and the extension of the lesion would be thereby caused with as great rapidity as in cases characterised from the commencement by deficiency of power. It is very different, however, when the gangrene has followed the more asthenic states of inflammation, or occurred in persons living in unhealthy situations and in very large cities; or when it has appeared in the dissipated and intemperate. Bleeding cannot be resorted to in these circumstances, and even lowering *purgatives* should be avoided. Yet recourse to purgatives is indispensable; the warmer or more restorative kinds, or a combination of them with tonics, being most appropriate. — In some instances, particularly when biliary collections may be presumed to have formed in the gall bladder or ducts, and when the part is merely in the incipient stage of gangrene, an *emetic* will precede the exhibition of a purgative with much benefit, especially in autumn.

58. *b*. It is principally when gangrene has just commenced, and been caused by the more acute forms of inflammation, in young or strong persons, that the *antiphlogistic regimen* should be prescribed; or, whilst the pulse still retains tone, and the surface presents an increase of temperature, the local change not having yet become associated with a general diminution of vital power. In this state, *diaphoretics*, conjoined with *opium*, or other *anodynes*, are also of much service, particularly after morbid secretions and fæcal accumulations have been freely evacuated by purgatives. They equalise the circulation, and, if judiciously selected, they improve the state of the blood; whilst the narcotic allays the morbid sensibility of the nerves of the part, and the general irritability of the system attending the early progress of this lesion. The nitrate of potash, subcarbonate of soda, with the spirits of nitric ether, and tincture of opium or of henbane, may, therefore, be prescribed in the camphor mixture, if the temperature of the skin continues above natural; or the same medicines may be given in the decoction of bark, or in the infusion of valerian, if the heat of skin be somewhat less. When the abdominal secretions are morbid, two or three grains of calomel, with as many of James's powder, may be taken at night, and a stomachic aperient the following morning, the solution of the acetate of ammonia, with the acetate of morphia in camphor mixture, or any aromatic water, being used during the day.

59. *c*. Internal gangrene is very rarely attended, even at its commencement, by a state of vascular action, requiring antiphlogistic remedies. It is chiefly when gangrene follows local injuries, in robust constitutions, and violent inflammation, or when it is attended by considerable excitement, that the above or similar measures are necessary. In other circumstances — as when it is consequent upon asthenic action, or when the antecedent inflammatory fever has assumed a lower grade — the treatment ought to be different or modified according to the states of action and of vital power. Surgical writers on gangrene, even up to the present time, have concerned themselves chiefly with the external manifestations of this lesion, without sufficient reference to the states of vascular action and of vital energy — to the changes in the organic nervous influence, in the circulating fluids, and in the abdominal secretions, which both favour its occurrence, hasten its progress, and modify its conditions. Hence the treatment of it has been viewed by them in a one-sided and an imperfect manner. Instead of agitating the question, as they have done even for ages, as to the propriety of bleeding, or of giving bark, at the commencement or during the progress of this lesion, they should have endeavoured to ascertain, if they did not know; and they should have informed us, if they knew; the circumstances requiring the one or the other, and the stages in which either ought to be employed. It is a matter of some astonishment to see practical writers of the present day differing so widely on this subject as they do—some prescribing bleeding, others cinchona, and many condemning all things besides their own methods or medicines, without considering the pathological states, for which either mode of treatment is most appropriate. The most important means of cure — whether bleeding, stimulants or tonics, amputating, external applications, &c.—have been

recommended for gangrene without sufficient reference to the states of vascular action and of vital power; or to the effect either of them may produce upon these states, and upon the disposition to limit or to extend the local disease; or to the influence they may exert in favouring the contamination of the circulating fluids, or in depurating the blood, and in promoting the functions of the principal secreting and excreting organs.

60. *d*. If the pulse be weak or soft, and the skin cool or moderately warm, the preparations of cinchona, serpentaria, and the muriate of ammonia; or the sulphate of quinine with camphor or ether; or the infusions of cascarilla, or of valerian, or of calamus aromaticus, with the chlorate of potash and chloric ether, will be requisite. At the same time, the excretions should be promoted by stomachic purgatives, as the compound infusions of gentian and senna, with the alkaline subcarbonates, and ammonia. — In a case which was ably treated by Mr. MORLEY of New Cavendish Street, to which I was called, this treatment was immediately efficacious. When diarrhœa is present, opium should be added to these tonics; or the chlorate of lime may be prescribed. In cases where the attendant inflammatory fever is about to pass into the nervous or putro-adynamic states especially if the gangrene have gone on to sphacelus, the exhibition of these, or of other tonics and stimulants, should not be delayed too long, otherwise the adjoining vessels may not be enabled to exert that degree of sthenic action requisite to the formation of coagulable lymph, whereby the extension of the lesion may be limited, and the absorption of morbid matters and the consequent contamination of the blood prevented. The stomach may become so irritable, when vital depression is not arrested sufficiently early, as not to retain the medicines most likely to be serviceable. This occurrence should be as far as possible prevented, as being most dangerous in itself, and as favouring the passage of morbid matters into the circulation. When it has appeared, I know nothing more efficacious in diminishing it than ammonia, large doses of Cayenne pepper, and opium, generally combined, and given in the form of pill. Warm wine and water, or brandy and water, with Cayenne, or other hot spices; or the acetate or muriate of morphia, with aromatics, may likewise be employed. Upon the whole, inflammatory gangrene, at an advanced stage, or gangrene consequent upon asthenic inflammation, or attended by the usual symptoms of adynamic fever, requires a very similar treatment to that which I have advised in the advanced periods of *Putro-adynamic* FEVER (see that article).

61. *B*. The constitutional treatment of *gangrene from debility* and deterioration of the circulating fluids (§ 16.) consists chiefly in the exhibition of tonics and stimulants; of the chlorates of potash, and of soda; of camphor, musk, and ammonia, with opium and capsicum; and of the other restoratives mentioned above (§ 60.); and differs in no respect from that advised, in diffusive inflammation of the *cellular tissue*, in the adynamic states of *erysipelas*, and in the typhoid forms of *fever*.

62. *C*. When *disease of the nerves* threatens the production of gangrene, the morbid sensibility usually present requires the exhibition of opiates in large doses, frequently with camphor, or ammonia, or the subcarbonates of the fixed alkalies and warm aromatics. Even on the threatened accession of this lesion, local depletions may be still required. Purgatives are generally beneficial. Warm anodyne fomentations may be applied to the limb, at this period; and the other external remedies of which mention will be made hereafter should be afterwards employed, particularly if the part pass into sphacelation. In other respects, the treatment should be conducted conformably with the principles developed above.

63. *D*. The treatment of *gangrene from obstructed circulation*, through either the vessels, or the heart, depends much upon the seat and cause of obstruction. — If inflammation of the arteries and veins be concerned in producing it, the means of cure ought to have reference to the states of vascular action and of vital energy, as in gangrene from inflammation; but, in respect to phlebitis especially, vital power and resistance should be so liberally supported, as to enable the vessels to form coagulable lymph, in order to limit the extension of the lesion, and prevent the contamination of the fluids. — When it is caused by *strangulation* of, or *pressure* upon, the veins, the treatment must entirely depend upon the states of vascular action and of vital power. The former ought not to be allowed to continue high, nor should the latter be permitted to sink, without having recourse to means to support the one, and to lower the other. — For senile gangrene, or that arising from *ossification* of, and impeded circulation in, the arteries, little beyond palliation of the urgent symptoms can be effected. The same remark applies to that caused by *disease of the heart*. Opium or the salts of morphia, either alone or conjoined with camphor, musk, ammonia, or similar substances; the alkaline subcarbonates, or the sub-borate of soda, with anodynes; tonics, antispasmodics, or stimulants, conjoined with these; attention to the digestive and excreting functions; the horizontal position; and farinaceous or milk diet may be severally employed in both these forms of gangrene.

64. *E*. *Gangrene from physical agents* should be treated according to existing states of local and general action and of vital power, which have been shown above to differ very materially according to the severity, seat, and duration of the injury. — That caused by *burns* requires bloodletting, if the vascular excitement be great. But action, in these cases, although high, is seldom attended by much power. Therefore vascular depletion should be practised in moderation and with caution; the nervous excitement and irritability of the system requiring the chief attention; for, if allowed to proceed, they increase remarkably the severity and extent of the local injury. When the shock sustained by the constitution has been severe, depletions will be injurious. In these cases, restoratives ought to be administered, generally with opium or other anodynes. These latter are required, in most cases, and they should be aided by such local means as will allay the painful heat and sensibility of the part. In severe injuries of this kind, the alarm of the patient, and the excitement directly produced by them, commonly occasion an appear-

ance of vascular reaction, which may mislead: but it generally subsides in a short time, especially if a full dose of opium is administered. When febrile action appears at a later period — after the immediate shock and alarm have subsided — and is symptomatic of the local inflammation, general or local depletions, purgatives and diaphoretics are then necessary. — The internal treatment of gangrene produced by cold, as well as of that caused by chemical agents, should be directed conformably with the principles already stated.

65. *F. Gangrene from poisons* requires more, perhaps, than any other form of this lesion, the use of internal remedies. — *a.* That occasioned by *spurred rye* is evidently connected with a deteriorated state of the circulating fluids, the affection of the nervous and vascular systems being consequent upon this state. Therefore the means of cure should be directed to the removal of this condition; and those already mentioned (§ 60, 61.) may be tried with this intention; especially the combination of the chlorides, with antispasmodics or tonics and narcotics. The opinions of writers who have had some experience in the treatment of this disease are very contradictory. Some advise emetics, bloodletting, and antispasmodics; others, narcotics and antispasmodics; and many, stimulants and tonics. This diversity is most probably the consequence of the different effects produced by the same means of cure, in successive stages of the complaint; and in epidemics presenting somewhat different characters; the changes thus arising obviously requiring a modified treatment. The means, however, which I have here suggested, or camphor, opium, and the alkaline subcarbonates, seem most deserving of confidence in this variety, particularly if aided by frictions, warm stimulating fomentations, and the warm bath, the alkaline carbonates or common salt having been dissolved in the water. The patient's strength should be supported by light, nourishing, and wholesome food.

66. *b.* The gangrene produced by *animal substances*, in a state of disease or of decay, should be treated very nearly as recommended in the articles on *Diffusive Inflammation of the* CELLULAR TISSUE, and on the adynamic state of ERYSIPELAS. The therapeutical indications are the same, namely, to excite and support vital power, and to allay irritability, and thereby to prevent the extension of disorganisation, by enabling the vessels to form coagulable lymph. With these intentions, combinations of tonics, antiseptics, and anodynes are resorted to, especially after morbid secretions have been evacuated by stomachic purgatives, and by enemata; and camphor, capsicum, and the acetate of morphia are prescribed, when nervous excitement or vascular irritability are very prominent. Ammonia, musk, chlorate of potash, sulphate of quinine, and warm aromatics, or spices, are generally beneficial; and may be given in various forms of combination, and in conjunction with opiates, according to the peculiarities of the case.

67. *c. Hospital gangrene* is the most common variety, and therefore the most important, of this species of disorganisation: in none has a greater difference of opinion existed as to the most appropriate method of cure. It is obvious that a *prophylactic* and *curative* treatment should be based only upon a correct idea of the causes, in the various circumstances in which this formidable malady presents itself. These causes are — 1st. A cachectic and debilitated state of constitution, generally connected with disorder of the digestive canal and liver; — 2d. A low, humid, and miasmatous atmosphere, and a damp, and an ill-ventilated place of residence; — 3d. Insufficient or unwholesome food, and the use of impure water. — 4th. An air loaded with putrid miasms or animal exhalations, as that of crowded hospitals, camps, ships and transports; — and, 5th. The contact of animal matter or of diseased secretions or discharges, as in using unclean sponges, &c. From what I have seen of the disease, in foreign hospitals, soon after the last war, I infer, that, although the fourth and fifth of these are the most common exciting causes, the others are often more or less influential, either in predisposing to it, or in directly producing it, especially after severe injuries and operations, or when aided by the depressing passions; and that the causes commonly giving rise to typhoid or putro-adynamic fever will often occasion it, especially in crowded surgical wards of hospitals.

68. *a.* The opinion of DELPECH as to the origin of this form of gangrene, which is very nearly the same with that which I have now advanced, has been called an "irrational conjecture, quite destitute of truth," by Mr. S. COOPER. M. DELPECH's views are derived from extensive and diversified observation, in both civil and military hospitals, and are neither irrational nor destitute of truth. It surely is not becoming to condemn with harsh censure what cannot be answered by sound argument. Many of the surgical writers upon this malady have hardly looked beyond the local origin of it; and have limited their curative measures too strictly to the gangrened part. Others have, with greater justice, relied on constitutional treatment, without, however, neglecting such local means as have been found serviceable. The utmost diversity of opinion also exists as to what internal and external remedies are most beneficial. The very inefficient and inappropriate medicines but too often used internally by surgeons in this disease, have proved a principal cause of their distrust of this method of cure; for whenever the expected result did not follow from the means employed, the cause of failure was not attributed to such means, but to the nature of the malady. It is a matter of astonishment that, with all the reverence with which the doctrines and practice of JOHN HUNTER have been viewed, the most important of both have been very generally neglected, in the treatment of this and other external lesions connected with constitutional disorder. This able man stated, as axioms in pathology, that a certain degree of vital tone or energy is requisite for the formation of coagulable lymph, by which the spreading of inflammation and sphacelation will be prevented; that where, owing to deficiency of vital energy, vascular action is incompetent to the formation of coagulable lymph, these lesions will extend, and the morbid fluids will contaminate the surrounding tissues; and that, in order to avoid these consequences, means should be used to increase the vital power of the vessels in the diseased part, and thereby to enable them to form coagulable lymph, by which disorganisation will be arrested. Although the

state of the circulating fluid is overlooked in these views, yet they are correct in the main, and form the basis of a rational and successful practice in this and several other maladies.

69. *β*. Before I proceed succinctly to state the practice I would recommend conformably with these opinions, and with the results of observation. I shall briefly notice the constitutional means advised for this disease by some experienced writers. On the first manifestation of hospital gangrene, *emetics* are recommended by Pouteau, Dussaussoy, Briggs, Thomson, and Hennen, and are evidently of service, at this period, when there are signs of biliary derangement. — *Bloodletting* is considered injurious or productive of little benefit by Blackadder, Thomson, and Boggie, whilst Dr. Hennen and Mr. Welbank consider that moderate depletion is serviceable early in the attack, and in strong plethoric persons; and that the risk of the disease attacking the lancet-wound may be prevented by accurate closure, and by allowing the bandage to remain undisturbed until the cicatrix is completely formed. — *Purgatives* are directed by Dr. Boggie and other writers, but they should be warm and stomachic, or conjoined with tonics, stimulants, or aromatics, and exhibited early in the disease. It is chiefly after morbid secretions have been evacuated by the early exhibition of emetics and purgatives, that advantage from tonics and stimulants will be most apparent; and it is probably from an insufficient attention having been paid to this circumstance, that so much difference of opinion exists as to the propriety of using these latter remedies.

70. *Cinchona* alone, or in various states of combination, is praised for its good effects in this disease by Boyer, and numerous experienced writers, whilst Hennen and Welbank considers that it is injurious. It is recommended in conjunction with the alkaline subcarbonates by Van Wy, and Saviard; and with camphor, by Flajani. — *Camphor* is much used in this form of gangrene by Continental practitioners. Pouteau, Conradi, Wenzel, and Ontyd prescribe it in large doses. I have seen much advantage derived from it; but I prefer to give it in the forms of combination to be mentioned hereafter. — The *arsenical solution* is directed by Otto. It may be employed in similar states of constitution, to those in which cinchona or sulphate of quinine may be prescribed.—*Arnica, cascarilla*, and various other stimulants and aromatics are recommended by various authors, but they are useful merely as adjuvants of other more active means. — *Acids* are noticed in favourable terms by Mr. S. Cooper, and several other writers; but I have much doubt of any benefit being derived from their internal use. The *hydrochloric* and *nitric acids*, or a combination of both, promise most advantages of this class of medicines.—Of the propriety of exhibiting *opiates* there can be no doubt; and most writers agree on this point, and differ only as to the period of having recourse to them. Dr. Thomson prefers them in the form of Dover's powder.

71. *γ*. From observation of the results of different modes of practice in hospital gangrene, rather than from my own active experience, I would advise the adoption of a practice consonant with the views stated above. Having evacuated morbid secretions and fæcal accumulations by emetics and warm stomachic purgatives, and directed a small or moderate bloodletting, in such cases only as are attended by excessive action and signs of plethora, I would advise the decoction of bark or the sulphate of quinine, in modes of combination appropriate to the peculiarities of the case. If vascular action continue very much excited, the decoction of bark may be conjoined with the nitrate of potash, the solution of the acetate of ammonia, and the spirits of nitric ether, or with the muriate of ammonia and chloric ether. When vascular action presents diminished tone, the sulphate of quinine may be exhibited in the compound infusion of roses; or in the form of pill with camphor. Where the pulse is weak and quick, the evacuations offensive, and the disposition of the gangrene to extend very evident, the decoction of bark should be combined with the chlorate of potash, and compound tincture of bark; and if anxiety, pain, or irritability be present, the tincture of opium or the muriate of morphia may be added. The great frequency of pulse, and loaded state of the tongue, generally observed in hospital gangrene, even indicate the propriety of having recourse to these and similar remedies, or to wine, in some cases. Regard should also be paid to the previous habits of the patient; and persons addicted to spirituous liquors may be allowed them, but in duely prescribed quantities. If the stomach become irritable, the treatment I have advised above (§ 60.) may be employed, or spiced wine may be given; or soda water, spruce or ginger beer, or Seltzer water, may severally be made vehicles of tonic, stimulant, cardiac, or aromatic substances.

72. If diarrhœa appear, and threaten to exhaust the powers of the constitution, opium, or the compound tincture of camphor, should be given in full doses, with the tonic and antiseptic remedies already mentioned; or the chloride of lime may be used internally with tonics and aromatics, or with camphor, and the warm spices, or administered in mucilaginous and emollient enemata. If delirium supervene, exhaustion of nervous power, with or without deterioration of the circulating fluids, may be inferred to exist; and camphor with opium, or henbane, the decoction of bark, with the alkaline subcarbonates and tincture of serpentaria, wine, and the other remedies recommended for *Putro-adynamic* Fever, and the low forms of Delirium (see these articles), should be prescribed with a decision commensurate with the urgency of the case. Camphor, in order to be beneficial in hospital gangrene, ought to be taken either in frequent, or in large doses. If vascular action be much excited, it will be advantageously conjoined with the nitrate of potash, or nitrate of soda, or the alkaline subcarbonates, or other saline refrigerants. If vascular action be weak or impaired, and vital power manifestly reduced, it should be combined with the preparations of cinchona, or of serpentaria, or with the chlorides and aromatics. Cascarilla, cinchona, or arnica may be severally employed, in similar forms of combination, appropriately to the circumstances of the case.

73. In this form of gangrene especially, prophylactic measures founded upon a knowledge of the causes specified above (§ 38.) should be strictly enforced; and, as soon as the disease manifests itself, the patient should be removed into a well ventilated and dry apartment, and the

mind encouraged by cheering prospects, and by the confidence of the physician in the extent of his resources. The local treatment ought to proceed, as will hereafter be noticed, conjointly with the above constitutional means of cure.

74. *d.* When gangrene follows the *bites of serpents*, the viper, or other reptiles, the constitutional symptoms will then be characterised by depression of vital action and power so extreme as to threaten immediate dissolution, and to require the exhibition of ammonia, camphor, capsicum, and other energetic stimulants in large and frequent doses. In cases of this description, recourse should be had to local means (§ 78.) immediately upon the receipt of injury.

75. ii. *Local Treatment.*—*a.* Topical measures ought to be directed with the following intentions; namely — 1st. To restore the tone of the extreme vessels in, or surrounding, the gangrened or sphacelated part; — 2d. To procure the separation of this part as soon as it passes into sphacelation; —and, 3d. To prevent the contamination of the circulation and surrounding tissues by the morbid matters proceeding from its decomposition. Substances calculated to accomplish either of these ends, will generally also attain the others. Their application should, however, not be delayed either until the gangrened part pass into sphacelation, or after this result has taken place, but should be brought in aid of constitutional treatment. Before the discovery of the chlorides, and kréosote, numerous ubstances were recommended to arrest the progress of gangrene, and to fulfil the intentions just stated. In cases of internal gangrene, measures of this description can but rarely be employed. In gangrene of the lungs, however, the inhalation of the fumes of kréosote, or of the chlorides, or dilute chlorine, has proved of more or less service. A judicious use of these in external sphacelus is frequently productive of decided benefit, as they fulfil all the above indications. Next to them in efficacy, are the turpentines, and the balsams, especially the spirits of turpentine, and the Peruvian balsam. When there are much pain and irritability of the part, opium may be added to the local applications. Many other substances have been recommended to be used topically in gangrene, but I must refer to the well-known work of Mr. S. Cooper for a sufficiently detailed account of them. A glance at the opinions of surgical writers on gangrene will readily show that each has been sufficiently disposed to enhance his own favourite application by depreciating those recommended by others, so that the inexperienced practitioner is bewildered amidst contradictory evidence on the subject. The substances already mentioned, especially Labarraque's fluid, strong solutions of the chlorides, or of kréosote, or of pyroligneous acid conjoined with kréosote, and spirits of turpentine, with or without this latter, are the most generally applicable. They may be used in the form of wash or lotion, or on the surface of any of the several kinds of poultices commonly prescribed.

76. *b.* In gangrene from *animal poisons*, the local treatment need not differ materially from that now advised. In this variety, as well as in others, different means have been recommended. The application of arsenic has been directed for *phagedenic gangrene*, by Fabricius Hildanus and Zinke; the actual cautery, by Celsus, Michel, Loefler, Murray, and others; powdered bark, with turpentine, by Knackstedt; these latter substances conjoined with the muriate of ammonia, by Dussassoy; the subcarbonate of iron, by Brandis; charcoal, by Marcus, Beddoes, and Bornemann; the pyroligneous acid by Simons; and a strong mixture of camphor in thick mucilage, spread over the part, by Schneider. In this form of gangrene, more, perhaps, than in any other, it is important completely to exclude the external air from the diseased surface, at the same time that the intentions with which external remedies are employed, should be strictly observed. Therefore, whilst the morbid secretions of the part should be prevented from accumulating, or be corrected by the antiseptics already mentioned, the access of air ought to be excluded by means best calculated to fulfil this end, and to be also the vehicles of antiseptic and stimulating remedies. A thick mucilage may, perhaps, be as advantageously used in this way as any other substance. But this intention is important not only in a curative, but also in a prophylactic, point of view. It is observed by nature in all external sores presenting a disposition to heal. When an eschar can be formed by any application, the end here kept in view may be accomplished by it. Indeed, the substances frequently resorted to in the present day, particularly the nitrate of silver, the actual cautery, and the stronger acids, as the nitric or muriatic, are beneficial by their operation in this manner, as much as by the stimulus they impart to the diseased surface.

77. *c.* The *hemorrhage* that often takes place upon the separation of the sloughs in phagedenic or hospital gangrene, may be arrested either by the means just mentioned, or by the application of the spirits of turpentine containing kréosote, or of strong pyroligneous acid with the superacetate of lead, or of a concentrated solution of the chloride of lime, or of any of the strong metallic salts.

78. *d.* In cases of the bites of poisonous reptiles, or even of the inoculation of virulent or morbid matter, the application of cupping glasses, or of other instruments by which the air may be exhausted over the seat of injury, was recommended by Celsus, and in modern times by Sir David Barry. The ancients, especially the Egyptians, resorted to suction for the removal of these and other poisons, when introduced by bites or wounds; and the practice is general even in the present day, in uncivilised countries; the fact having been well known to them, that the individual administering this sort of aid, will not himself be injured, if no abrasion exist on his tongue or lips. The common procedure in these countries, is immediately to place a ligature above the part where the poison has been inserted, when this can possibly be done, and next to have recourse to suction for its removal. I have seen this practice resorted to on two or three occasions, with success. When, however, it has been too long delayed, or cannot be adopted, ammonia, spirits of turpentine, and various stimulating substances may be applied to the part, as advised in the article Poisons. If gangrene have taken place, the local remedies noticed above, are the most appropriate.

79. iii. The *Diet* and *Regimen* in gangrene must necessarily be regulated according to the peculiarities of the case; but, in general, a mild, spare, and

digestible diet only should be prescribed. If the patient enjoy not a pure and dry air, he should, if possible be removed to a situation possessing this advantage. His mind should be encouraged, and his confidence insured, by the attention of his attendants, and the bearing of his physician.

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GASTRODYNEA. See article Stomach — *Altered Sensibility of*.

GASTRO-ENTERIC DISEASE. — Syn.

Gastro-enteritis. *Gastro-entérite*, Broussais.

Classif. — General Pathology.

1. The diseases of the stomach and intestines are treated of in separate articles. But not infrequently both the stomach and intestines are more or less affected at the same time by inflammatory irritation or action, either primarily, or consecutively of other diseases, although not in the same manner, or in the same degree. — Inflammatory disorder coexisting in the stomach and intestines, although not so common, as M. Broussais has contended, is certainly very frequently observed, especially in connection with other complaints. Even when appearing as the consecutive ailment, its importance is often so great as to require attention to be directed chiefly to it in forming

the intentions, as well as in selecting the means, of cure.

2. Of the modern writers on Medicine, none has entertained juster views on the subject of gastro-enteric disorder, than Dr. W. STOKES, who has remarked that the pathology of the digestive canal has been but imperfectly understood in these countries, and that consequently a mode of practice productive of injury to human life has been too generally adopted. Several causes have conduced to this: —1st. The importance that has been long attached to disorders of the liver; — 2d. The empirical or routine practice, introduced by the writings of HAMILTON and ABERNETHY; — and, 3d. The distrust with which the doctrines of BROUSSAIS have been viewed, owing to the unwarranted generalisations of which they in a great measure consist. If the school of BROUSSAIS have thus gone too far in attributing importance to gastro-enteric disorder, the writers and practitioners in this country have erred as remarkably, in overlooking it almost entirely. When we consider the connections of the digestive mucous surface, with the rest of the organisation, by means of that system of nerves which chiefly supplies it, and the important functions which this surface performs, we may infer that irritations, or inflammatory excitement, commencing in this quarter, will often be reflected on distant, but related organs. In childhood, and in early life, whilst the susceptibility of the system is at its maximum, the disorders consequent upon gastro-enteric irritation are diversified, of frequent occurrence, and often serious; and at later epochs of existence, although they may not be so obvious, nor so common, yet they are occasionally attended by danger. It becomes, therefore, a matter of extreme importance in medical practice, to trace the connection, the priority, and the procession, of morbid action in those parts of the system which are most intimately related to the digestive canal. The practitioner will find, on numerous occasions, disorder of this part associated with that of the cerebro-spinal nervous system, of the respiratory organs, of the heart, of the liver, or of the skin; and, although the affection of the digestive canal will sometimes be consequent upon, or coëtaneous with, either of these related disorders, yet a different order of succession will be much more frequently observed.

3. I. *Connection of Gastro-enteric Irritation or Inflammation, with Affections of the Cerebro-spinal Axis.*—Affections of the brain and spinal cord are often complicated with disorder of the digestive canal. In many cases, the latter is merely functional, and depends entirely upon the intensity and extent of the former; but much more frequently, the affection of the brain is induced by irritation of the gastro-enteric surface. In children, this latter occurrence is remarkably common; and even in adults, a slight degree of disorder of the stomach is often followed by headach, somnolency, and incapability of mental exertion. The occasional dependence of epilepsy in adults, and of convulsions in children, upon morbid action in the digestive canal, is fully shown in the articles upon these diseases. Inflammation of the membranes, or of the substance of the brain, and acute hydrocephalus, sometimes also supervene upon gastro-intestinal irritation; and, in the course of their development, render obscure, or entirely mask, the primary ailment; for, as LALLEMAND has remarked, as soon as the cerebral affection mounts to such a pitch, as even partially to obscure sensibility, the existence of disorder in the digestive canal is ascertained with great difficulty. I believe that the majority of cases of the affection, recently denominated spinal irritation, are caused by gastro-enteric disorder; chronic irritation in this latter situation being propagated to the spinal cord through the medium of the ganglial nerves communicating with the roots of the spinal nerves. It is of great importance to keep these pathological states in recollection, and to ascertain as far as may be their priority; for when affections seated in the cerebro-spinal axis are consequent upon gastro-intestinal irritation, a treatment directed for the removal of the former without reference to the nature of the latter, may, especially if it be of an exciting nature, aggravate and perpetuate the mischief.

4. This principle has been carried to an extreme length by M. BROUSSAIS, who has proscribed the use of purgatives even in the more dangerous affections of the brain, from the mistaken idea that purgatives will necessarily increase the already existing irritation of the digestive canal, of which he supposes the cerebral disease to be almost always a consequence. This doctrine comprises two assumptions: — 1st. That the affection of the brain necessarily depends upon pre-existent irritation of the digestive canal; — and, 2d. That the exhibition of purgatives will increase this irritation, and thereby aggravate the cerebral disease. As to the first of these, it may be answered, with perfect truth, that the procession of morbid action he contends for, is only occasional or contingent upon concurrent circumstances: and, as respects the second, the converse of the proposition is probably the more correct; for a judicious exhibition of purgatives will frequently remove irritation of the digestive canal, especially if it be caused by unwholesome ingesta, or morbid secretions, or fæcal accumulations; and, even when it cannot be referred to either of these, but rather to the state of vascular action in the digestive surface, the augmented secretion procured by refrigerant or mild purgatives may promote its resolution, or diminish its intensity.

5. II. *Connection of Gastro-intestinal Irritation with Disease of the Respiratory Organs.* — *a.* The association of gastro-enteric irritation with most of the complaints observed in the respiratory organs, is of greater frequency than is generally supposed. Diseases being so universally described by writers and teachers as species of unvarying form, and without sufficient reference to diversity of character and complication, their more important connections and associations with other maladies are completely neglected, and are unknown to the young practitioner until obtruded upon him in practice. The complication of *bronchitis, catarrh,* and other affections of the respiratory organs with gastro-enteric irritation, has been noticed when treating of these disorders. With respect, therefore, to these, I have only now to remark, that I have seen both forms of disorder follow coëtaneously upon the exciting cause, and that the prior existence of the gastric disorder has often predisposed to the bronchial or pulmonary disease, a very slight exciting cause being suffi-

cient to produce the latter, when the former is present.

6. *b.* During a number of years, I had almost daily occasion, at the Infirmary for Children, to enter against the names of some of the patients, *gastro-catarrhal fever*, or *gastro-bronchitic irritation* or *inflammation*, according to the features of the case, as the names of the affections for which they were admitted. In these, it was difficult, if not impossible, to determine which was the primary disorder; but it was always evident that the complication was attended by much danger, the more especially as it occurred chiefly in debilitated or delicate children, and extended to the bronchi of both lungs. In many instances, the affection of the mucous membrane appeared to be universal, and the progress to a fatal issue was very rapid. Gastro-enteric irritation, although it can scarcely be considered as a cause of *tubercular consumption*, unless when it has continued long, is a very frequent concomitant of the early, as well as of the advanced stages of this malady. I have often observed that, when the former has been aggravated by improper diet or treatment, the latter has also been exasperated. (See TUBERCULAR CONSUMPTION.)

7. *c.* Even the occurrence of *pneumonia* may be favoured by disorder of the digestive canal; and, in this case, the pneumonia may assume a nervous or low character, constituting the *Pneumonia nervosa* of the older writers. The association of disorder of the digestive mucous surface with affections of the respiratory organs, although more generally neglected than might have been expected from the state of science at the present day, has long attracted some attention, as evinced by the notices taken of it by the older and modern writers, by the names *Stomach-cough*, *Verminous Cough*, and *Dyspeptic Phthisis*. In *hooping cough*, it is often difficult to decide whether the digestive or the respiratory mucous surface be the most affected: the vomiting in which paroxysms of cough terminate in various affections of the chest, is perhaps as much owing to attendant gastric irritation, as to the convulsive action of the respiratory organs. In all cases, therefore, in which we have reason to dread the origin or association of pulmonary, or cerebral disease, with gastro-intestinal irritation, inquiries ought to be made for the symptoms by which this latter is indicated. When pain, tenderness, or tension at the epigastrium, or in the abdomen, are present; and particularly if the pain be increased on pressure, or be attended by nausea, flatulency, or acrid eructations, or occasional vomiting, and an irregular state of the bowels, the existence of gastro-enteric inflammation should be inferred, and the treatment ought to be directed to its removal. The means of cure, also, required for the pulmonary complication should be so devised as not to increase, if they may not diminish, the gastric irritation. The diet of the patient ought to be prescribed with similar intentions. When pulmonary affections are thus complicated, the treatment of them by means of tartarised antimony is frequently injurious, particularly in children, as tending both to aggravate the gastric disorder, and the nervous depression often attendant upon them. Even when pneumonia is thus associated, the tartar emetic may be dispensed with; and, as Dr. W. STOKES justly advises, the strength of the patient must be supported by a farinaceous food, jellies, and broths, even whilst local depletions, and external derivatives, are being employed. The connection of gastro-enteric irritation with tubercular consumption is one of the most important topics in practical medicine, and one which has been imperfectly understood, and, with a very few exceptions, overlooked, by writers in this country. As the subject, however, belongs especially to this disease, in its practical bearings, it is considered under that head.

8. III. *Gastro-enteric Irritation* often induces severe *disorder of the vascular system.* — This, perhaps, is the most common occurrence met with in practice. The febrile disturbances consequent upon irritating ingesta are so frequent, and so generally admitted, as hardly to require notice. Amongst children, they are constantly appearing, and almost as constantly are removed by means appropriate to the cause of irritation. If this be indigestible substances, an emetic, or purgative, will be the most efficacious, and by no means the most unsafe, treatment that can be adopted, notwithstanding the horror entertained by BROUSSAIS and his followers of these medicines. In such cases, the disorder subsides on the removal of its cause; but when it is induced by the inordinate use of stimuli, or by other causes that have either ceased to act, or admit not of so ready a removal, it will be better to leave the case to nature, than prescribe this treatment. In these circumstances, *refrigerants*, cooling *diaphoretics*, and mild *sedatives* with *emollients*, are the most appropriate. The nitrate of potash, or the nitrate of soda, the alkaline subcarbonates, the muriate of ammonia in small doses, sulphate of potash, and ipecacuanha, are severally of use, particularly in mucilaginous or emollient vehicles; but the bowels should be kept freely open by mild, oleaginous, or refrigerant purgatives.

9. I have already insisted upon the fact, that purgatives or laxatives, when judiciously selected, will rather diminish than increase gastro-enteric irritation. Some doubts may exist as to the operation of calomel in this way; but an extensive and diversified experience of this substance, and the experiments performed with it by Mr. ANNESLEY, have convinced me that in full doses it diminishes irritation and inflammation in the stomach and small intestines, whilst it increases, or even excites, these morbid states in the large bowels, and depresses nervous power, or augments the general susceptibility and irritability of the frame, especially if frequently exhibited, or continued for a considerable time.

10. IV. The *Connection of Gastro-enteric Disorder with Fevers*, is sufficiently illustrated in the articles on these diseases. It has formed the basis of M. BROUSSAIS' pathology of fever. Little, therefore, need be added at this place respecting it. The fact, however, must be admitted, that gastro-enteric inflammation, in more or less manifest grades, is one of the most prominent and constant phenomena of the invasion of exanthematous fevers; and that a somewhat similar state of vascular injection, or irritation, exists at this period in the stomach, and upper portions of the intestinal canal, to that which subsequently appears on the cutaneous surface:

the former, however, subsiding as the latter becomes developed. This is satisfactorily proved by the character of the symptoms, more particularly by the nausea, vomiting, epigastric tenderness, redness of the fauces, and edges of the tongue, &c. A somewhat similar condition most probably exists in the early stages of typhus and other fevers; but it is in the advanced periods of these, that the gastro-intestinal surface becomes most prominently affected. In exanthematous fevers also, particularly in delicate and cachectic subjects, or when the eruption has not been fully evolved, or has been delayed or suppressed, or has prematurely disappeared, the gastro-enteric disorder not infrequently is the most serious part of the disease, in respect both of the lesions in which it is prone rapidly to terminate, and of the cerebral affection, which it occasionally superinduces. It must not, however, be supposed from this statement, that I consider gastro-enteric irritation, or inflammation, to be the proximate cause or primary pathological condition of fevers. I merely contend that it is often one of the most prominent and important of the several lesions observed in their early stages, but is produced by changes still earlier in the chain of morbid causation.

11. There can be no doubt of the fact, insisted upon by **BROUSSAIS** and other French pathologists, that erythema, or inflammatory injection of the gastro-intestinal mucous surface, is a very general phenomenon in fevers, and that it may, and very often does, exist without pain, or even tenderness on pressure; but, however intense and prominent it may appear amid the various lesions characterising these maladies, it is certainly not the cause of the changes and symptoms attributed to it by these writers. Inflammatory irritation of this part, as severe as that observed in any form of fever, may exist without fever at all, and still more without the extreme prostration, which they believe it to occasion. The intestinal mucous surface suffers merely in common with all other tissues of the body in the progress of essential fever; but it is much more obnoxious to alterations than any other part, owing to the nature of its organisation, to its relations with other viscera, and to the numerous and diversified causes of irritation to which it is constantly exposed, particularly the morbid secretions, and the incongruous and exciting substances, continually passing over it.

12. V. *Connection of Gastro-enteric Irritation with Hepatic Disorder, &c.* — *a.* I have insisted, in the article DUODENUM, on the importance of attending to disorders of the upper portion of the intestinal canal, and of distinguishing between them and the affections of the biliary organs. Disorders of the stomach extending to the duodenum and jejunum, or even further, have been often treated in this country for diseases of the liver; and it must be admitted that the difficulty of forming a diagnosis between them is great. But the disorders of these portions of the alimentary canal, which are thus liable to be mistaken, are not so uniformly inflammatory as Dr. W. **STOKES** appears to believe, in his very acute observations on this subject; or, if they be, the inflammation is greatly modified by its connection with nervous asthenia, or other morbid states. — When, however, gastro-enteritis is really present, two great evils result, as this able physician has remarked, from mistaking it for affections of the liver; — one, the neglect of the actual disease; the other, its exasperation by means supposed capable of removing the hepatic disorder. The consequence is, that the gastro-enteric irritation, being increased by the inappropriate treatment adopted, extends along the ducts, or by nervous and vascular connection, to the biliary apparatus; and thus the disease, which was in the first instance incorrectly supposed to exist, is actually superinduced by the means erroneously resorted to for its removal. M. **BROUSSAIS** has insisted upon inflammations of the liver being always consecutive of gastro-enteric inflammation. This, however, is one of the several generalisations at which he has arrived from insufficient data. But, until he wrote, the fact that irritation of the digestive canal, allowed long to exist, or to go on to inflammatory action, frequently induces chronic hepatitis, was entirely overlooked. There can be no doubt that prolonged and frequently repeated over-excitement of the digestive canal, by a too rich, stimulating, or full diet, or by spirituous or fermented liquors, is often followed by hepatic disease; but, as shown in the article LIVER, other causes, besides gastro-enteritis, are concerned in producing it. One of the most common circumstances in the production, or exasperation, of intestinal irritation, and of the ultimate supervention of chronic hepatitis, is the improper or too frequent use of acrid purgatives, — a practice to which I have traced a number of the cases of hepatic disorders which I have seen in a warm climate, and more recently in this country, particularly among persons who have returned from the East Indies, or from other places within the tropics.

13. The occurrence of disease of the liver, and even of abscess of it, consecutively upon chronic diarrhœa, and dysentery, has long attracted the attention of most practitioners in warm climates. In many of such cases, although there may have been reason to suppose, that the hepatic disorder preceded, or even caused, the intestinal affection, there can be no doubt that the persistence of this latter, or the exasperation of it, by a purgative treatment, has rendered the former more acute and manifest. Some difference of opinion exists as to the mode in which the gastro-enteric disorder is propagated to the biliary organs. Some suppose that the excitement is sympathetically extended to them, this extension being favoured by the associated functions of these different organs. Others believe that the inflammation has spread from the mucous surface of the duodenum to that of the biliary ducts. Instances have been adduced by **ANDRAL**, **RIBES**, **BOUILLAUD**, and **REYNAUD**, which favour the inference that inflammation commences in the radicles of the mesenteric veins, and extends along the vena porta, and its ramifications in the liver. This, however, must be a circumstance only of occasional or rare occurrence. I have, however, long since supposed that the more acute attacks of inflammation of the substance of the liver, and the purulent collections frequently formed in it, in the course of chronic dysentery, have been superinduced in this manner. — Upon the whole, it may be inferred, that in complications of gastro-enteric with biliary disorder, either lesion may have been primary. But

that in this climate, especially, the gastro-enteric more frequently precedes than follows the hepatic affection. In warm climates, the converse of this probably obtains, although not to the extent very generally believed by many practitioners who have written on intertropical diseases.

14. *b.* That disease of the *mesenteric glands* is generally induced by the frequent recurrence or persistence of gastro-enteric irritation and inflammation, often connected, however, with various other elements of disorder, is sufficiently evident, and now very generally admitted. And yet I have seen, especially at an early period of my practice, this malady treated by purgatives, sometimes of a very acrid nature. The enlargement and obstruction of these glands, depending chiefly on the affection of the digestive mucous surface, can be remedied only by the previous removal of this affection, and by the prevention of its recurrence. When this end is obtained by local depletions; by refrigerants conjoined with the alkaline subcarbonates, ipecacuanha, and demulcents; and by suitable diet and regimen; the consecutive disease of the glands often gradually disappears.

15. VI. *The Connection of Gastro-enteric Inflammation with Diseases of the Skin,* is much more general than practitioners in this country suppose. It is chiefly owing to the irritation of the digestive mucous surface in various grades of severity, that the cutaneous affection resists so long the treatment prescribed for its removal. I have repeatedly seen cases of eczema, and of other obstinate diseases of the skin complicated with the slighter and more chronic grades of gastro-enteritis, the latter being even so prominent as to be indicated by epigastric pain and tenderness; yet arsenical, or other irritating medicines, were exhibited in no small quantities; and, although they were evidently exasperating both the internal and external affections, they were continued with a perfect belief of their applicability. Upon the adoption, in these cases, of general or local depletions, of refrigerant medicines, of warm and medicated baths, and of a light and appropriate diet, all disorder has soon after disappeared. The chief reasons of diseases of the skin proving so obstinate, are — 1st. This form of complication; — 2d. The inflammatory diathesis and vascular plethora characterising them; — 3d. The neglect of these pathological associations, and the adoption in consequence of inappropriate means of cure; — 4th. Inattention to diet and regimen, particularly as respects the use of animal food, and stimulating beverages and articles of diet; — and 5th. An insufficient observation of the states of assimulation and excretion, with the view of perfecting the ormer, and of promoting the latter.

16. VII. *Chronic Gastro-enteritis is often associated with Affections of the Genito-urinary Organs, and with Gout.* — We sometimes observe leucorrhœa and other uterine disorders connected with gastric irritation; the former most frequently being induced, or favoured in its occurrence, by the latter. Difficult or scanty menstruation is occasionally traced to the same cause. In these cases, the means calculated to relieve the disorder of the digestive mucous surface, are generally most efficacious for removing the sympathetic affection. A similar association of the disorders of the digestive and urinary passages is sometimes also observed; but it is unnecessary to do more than to refer to it. How far gastro-enteric irritation may influence the states of urinary excretion, has never been so fully illustrated as is to be desired. What we know of the subject is derived from the researches of Dr. Prout; and it is to be hoped that this scientific physician will proceed in his investigations into it. There can be no doubt that a state of chronic irritation, or of inflammatory erethism, of the digestive mucous surface, will so impede the functions of digestion and assimilation, as to cause a superabundance of materials in the blood, calculated to excite or to disorder the actions of the kidneys, and requiring to be eliminated from the circulation. When this disorder of the gastro-enteric surface is attended, as it not infrequently is, with a craving or morbidly excited appetite, food is taken in larger quantity than it can be digested; and much imperfectly formed chyle is carried into the blood, where it excites disorder of the liver, of the kidneys, and of the skin, in the course of the excretion of the unassimilated matters by these organs. — To this source may be traced, in many instances, not only the morbid conditions of the urine, and of the kidneys themselves, but also the production of an attack of *Gout,* in a regular or irregular form.

17. The *therapeutical indications,* and even the *means of cure,* for these various gastro-enteric complications, may be readily inferred from what has been stated above. — More precise information will, however, be obtained as to these topics, and as to the *causes* of the gastro-enteric disorder, by referring to the articles Gout, Indigestion, Intestines, Stomach, &c.

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GLANDERS.

Classif. — III. Class, III. Order (*Author,* see *Classif.* in *Preface*).

1. Defin. — *Vascular injection, and chancry sores of the membrane of the nose, frontal sinus, and parts adjoining, with a profuse offensive discharge, and pustular eruptions, or tubercular and gangrenous ulcers in various parts, preceded by constitutional disorder, attended by fever of a low or malignant character, and produced by contagion.*

2. Glanders until lately was considered exclu-

sively to belong to the horse, the ass, and the mule. Within these few years, several cases have occurred, showing that it may be communicated to man, in either the acute or chronic form. About twelve years ago, in the course of a discussion at the Medico-Chirurgical Society, I stated, that the fact of the disease having been thus communicated, had been proved by cases that had occurred in Germany. The cases to which I then alluded were published in *Rust's Magazine*, for 1821. Since then, cases have been observed in this country, and published by Mr. Travers, Mr. Brown, and Dr. Elliotson. It is to this last gentleman, however, that we are most indebted for a full elucidation of the subject, by his able researches. The frequency of the occurrence of the disease in the human subject justifies the notice that will be taken of it in this work.

3. *Acute* and *chronic glanders* are contagious amongst the animals just mentioned; but from the facts adduced by Mr. Coleman, Dr. Ashburner, and Dr. Elliotson, it evidently appears that the disease may be generated anew, when horses are shut up in a confined space for a long time, as on board transports. The characteristic symptoms of the disease in its acute form in the horse, are — intense inflammation of the pituitary membrane, attended by erosions which soon pass into chancre-like sores; swelling of the lips and nose; rapid extension of the ulceration, giving rise to a purulent and disagreeable discharge, which often passes to a purplish, or bloody, and horribly fœtid sanies; subsequently, gangrene of the nasal membrane, with increased discharge, sometimes with slight hæmorrhage; swelling and pain of the sublingual glands; inflammation of the conjunctiva and nasal eyelid, quickly passing into a livid and swollen state, with an offensive sanious discharge; and fever of a putro-adynamic or malignant character. As the local changes extend to the adjoining parts, respiration becomes laborious, and the superficial vessels congested, the animal dying in a few days, or after a longer or shorter interval. If the disease is protracted, the symptoms sometimes relax, but the state of the pituitary membrane, and the character of the discharge, show that it has degenerated into a chronic form. Pustules may also appear in the progress of glanders, with gangrene of the external parts of the face, and tumours with swelling of the extremities, the disease being thus associated with farcy, which is a modification of it.

4. The *farcy glanders* generally appear in the form of small tumours about the legs, lips, face, neck, or other parts of the body: these tumours vary in size, and in the rapidity of their progress to ulceration. They sometimes create little inconvenience, particularly in a chronic state; but at other times, they are large, painful, numerous, and rapid in their course. They are at first hard; soon become soft, burst, and degenerate into foul ulcers, with abrupt edges, and of a pale glossy appearance. Lines of communication are generally observed between these tumours or ulcers, particularly when seated on the insides of the limbs: these lines are inflamed and enlarged absorbents.

5. I. Description of Glanders in the Human Subject. — Dr. Elliotson remarks that glanders may appear in the human subject in different forms. — 1st. In that of *simple acute glanders;* the disease attacking the nasal cavities and adjoining parts. 2d. In that of *acute farcy glanders;* the malady appearing in various parts, in the form of small tumours, giving rise to foul ulcers, suppuration, &c. 3d. These varieties may exist separately, or they may be both produced at the same time, or the one may precede the other. 4th. Each of them may also occur in a *chronic form*, and, in this form, also, may exist separately, or be conjoined. That the acute true glanders, and the farcy glanders, are the same disease, is proved by the fact, that the matter deposited in the tumours characterising the latter, or that coming from the nostrils in the former, gives rise to either of these varieties, or to them both conjoined; or, in other words, that simple acute glanders may proceed from the matter of farcy, or from its own discharge, and that farcy glanders may arise from the discharge from the nostrils in simple acute glanders.

6. i. *Simple Acute Glanders* appears to commence with rigors, headach, irritability of stomach, depression of spirits, prostration of strength, stiffness and severe constant pain of the joints, aggravated on motion, and great thirst. The patient, moreover, complains of much heat about the nasal organ and windpipe, accompanied with a copious viscid discharge. The nose and surrounding parts become swollen, hot, excoriated, and of a bright red or livid colour; one or both eyes are inflamed, or completely closed; a profuse tenacious mucus, at first of a deep yellow, but afterwards of a bloody or dark sanious appearance, exudes from one or both nostrils, sometimes also from the eyes; and several hard phlyzaceous pustules appear on the nose and adjacent parts, and on the neck, trunk, arms, thighs, and legs. The temperature of the skin is increased; the pulse is remarkably frequent, soft and weak, or undulating; the respiration, rapid, weak, and shallow; the tongue dry, rough, and brownish red; thirst is unquenchable; the stools are watery, or slimy and offensive; the voice is weak, and the mind incoherent or wandering. Copious offensive sweats, a livid or gangrened state of the nose or of adjoining parts, delirium, tremors, and restlessness, are also observed; followed by sinking of all the vital powers, disappearance of the pulse, and death within a very few days; the fœtor from the discharges, and from the whole body, towards the close of the disease, being insupportable.

7. *Upon inspection post-mortem*, the morbid appearances, especially those which are external, are greater on one side of the body than on the other. The lungs are engorged with dark fluid blood; the bronchi are livid, congested, and partially filled with a dark frothy mucus; the nostrils and frontal sinuses contain a glutinous matter, of a brownish colour, and the lining membrane is studded with ulcerated white tubercles or granules; irregular ulcers, or white circular chancres, sometimes also exist in the upper parts of the air-passages; purulent deposits are occasionally found in some of the internal viscera; and the mucous surface of the digestive canal is softened and discoloured at various points. White tubercular formations, resembling those found in the membrane of the nose, sometimes also exist in the mucous membrane of the large bowels.

8. ii. *Acute Farcy Glanders* seems to commence

with severe pain in the joints and limbs, and with the other symptoms attending the invasion of the preceding variety. Small tumours arise in different parts of the body, but are more numerous on one side than on the other, and have a glossy red appearance, which soon changes to a dark brown. They also affect the head, or even the face, and chiefly on one side. They are painful, soon crack on the surface, and exude a thin acrid sanies: they vary in size, and are generally accompanied by phlyzaceous pustules in different parts of the body. Perspiration is free, copious, and fœtid; and the stools are watery, offensive, or otherwise morbid. The fauces are injected, and of a purplish hue; thirst is great; the tongue foul, loaded, and dark-coloured; the pulse quick, and easily compressed, afterwards small, and scarcely perceptible; and the other symptoms attending a fatal termination soon afterwards appear, as in the preceding form. On *inspection after death*, the tumours are found deeply seated. On removing the gangrenous integument covering them, a layer of brown glutinous matter is seen covering small white tubercles, having the same appearance as those found in the frontal sinuses, and nasal cavities, in acute simple glanders. These tubercles on the forehead or scalp are generally connected with the pericranium; but, on the limbs, with the fasciæ. — In some cases, on dividing the larger livid or gangrenous tumours, down to the bone, the muscles appear decomposed, are of a dark colour, exhale a peculiar fœtid odour, and contain specks of purulent matter, as it were infiltrated through their substance. Underneath these muscles, clusters of circular grey tubercles are also found, firmly attached to the periosteum, and resembling those that are more superficial, as in the pericranium, &c. The muscles generally, even those remote from the tumours, are blanched, flabby, or softened, and the cellular tissue is infiltrated with a yellowish serum. The Schneiderian membrane, frontal sinuses, and parts adjoining, are sometimes thickened, or studded with white tubercles. The blood is dark, fluid, and decomposed; and the heart flabby and pale.

9. When *acute farcy* is conjoined with *acute glanders*, the affection of the nares and respiratory organs, the phlyzaceous pustules around the nose and mouth, and the consequent fœtid, sanious discharge, and disorganisation, are associated with the foregoing phenomena; but the constitutional symptoms are not thereby otherwise changed, than in being aggravated, or rendered more malignant, or more rapid in their progress to dissolution. — In such cases, the morbid appearances of the nares, fauces, and respiratory surfaces attending the acute glanders, are superadded to those characterising acute farcy.

10. iii. *The Chronic Forms of Glanders.* — Simple chronic glanders is confined chiefly to one nostril, and is characterised by a glutinous and very offensive discharge, the fœtor being peculiar, and remarkably disagreeable. There are itching, with a constant desire to blow the nose, and a sensation of stuffing. In the slightest state of the disease, these may be the principal symptoms; but, in an advanced stage, or in severer cases, there are pain between the eyes and down the nose, with suffusion of the eyes, and ulceration of the Schneiderian membrane; the discharge being copious, puriform, or sanious. These symptoms are usually preceded by shiverings, giddiness, and by weakness and pains of the limbs; and are followed by more or less constitutional disturbance. As the disease proceeds, purulent collections form in different parts. There are, moreover, loss of appetite, nausea, swimming, or pains of the head, occasionally wanderings of the mind, pains in the back and limbs, thick, discoloured, or fœtid urine, and slimy, or otherwise morbid evacuations. From this state, the patient may slowly recover, after an indefinite period, or may sink gradually, from prostration of all the vital powers, with appearances of contamination of the circulating and secreted fluids.

11. *Chronic farcy glanders* are generally preceded and accompanied by chills or rigors, and aching pains through the body and limbs, resembling rheumatism. Tumours gradually form about the face, trunk, and limbs; these break and give rise to an unhealthy discharge; and are attended or followed by disease of the absorbents and glands, or by purulent collections in the joints, or in various parts of the body. The disease may commence in this manner, and thus terminate; or it may pass into the state of chronic glanders; or, in other words, the affection of the respiratory passages characterising simple glanders may be superadded; or, it may commence in this latter form, and be followed by the symptoms more especially marking the chronic form of farcy. In either case, the matter produces, as shown by the experiments of Mr. Coleman and others, acute glanders or farcy indifferently.

12. iv. The *Nature of this Disease* may be inferred from the history here given of it. It is evidently the result of a specific morbid matter, contaminating the surfaces and parts to which it is applied, affecting the organic functions, and giving rise to the changes characteristic of it. The state of the blood has not been sufficiently attended to in the history of the cases which have been put upon record. In several of those that occurred in Germany, the blood taken at an early period of the disease, appeared to be cupped or buffed; but it afterwards seemed deficient as to crasis, or partially dissolved, and very dark. In the variety of farcy, the absorbents, as well as the glands, appear to be much affected, probably owing to the passage of morbid matter along them; but there is much yet to learn as to the history of the disease, and the lesions which it occasions, and still more, as to its treatment.

13. v. The *Prognosis* of the acute varieties of glanders is extremely unfavourable; all the cases observed in the human subject having terminated fatally. The chronic states of the malady seem not much less dangerous. Two or three, however, of these which have been recorded, appear to have recovered. In one of those mentioned by Mr. Travers, the patient was cured by means, one of the principal effects of which was to produce frequent vomiting. Dr. Elliotson remarks, in his last paper on this disease, that its occurrence in the human subject is by no means of extreme rarity; and that, since the publication of his former paper, upwards of a dozen cases had been mentioned to him by medical men.

14. II. Treatment. — Our knowledge of the treatment of this malady has not been much advanced by the experience we have hitherto had

of it in the human subject. The *prophylactic means* are, however, made sufficiently evident by the recognition of its *cause*. There can be no doubt that it is communicated to man only by contact of the morbid matter proceeding from another person or animal suffering from it; and it would appear that the infection is most certainly produced by this matter being brought in contact with an abraded or punctured surface. Whether or not it is capable of producing the disease by being applied to the unabraded mucous surface, or by merely contaminating the air breathed by the unaffected, is certainly not proved as respects the human subject, although there are a few facts which seem to favour the affirmative conclusion. As regards, however, the horse and ass, there can be no doubt of the frequency of this mode of infection; and, indeed, of the possibility of the disease being generated *de novo*, when circumstances such as those already alluded to (§ 3.) contaminate the atmosphere, in which a large number of those animals are confined.

15. The *method of cure* is not so evident as the means of prevention. It may, nevertheless, be directed with the following *intentions*: — 1st. To arrest the progress, or change the character, of the local affection; — 2d. To moderate or modify the constitutional disturbance accompanying it; — and, 3d. To counteract the contamination of the fluids and soft solids taking place in its progress, and to support the powers of life. These indications require means for their fulfilment, possessed of energy proportionate to the violence of the disease; and whilst the local symptoms are attacked, the constitutional powers should be assisted in opposing their extension. With these views, the more volatile stimulating antiseptics, or warm aqueous vapour conveying their fumes, may be inhaled, or diffused in the patient's apartment. Solutions of the chlorides may be sprinkled around; or pyroligneous acid, with kréosote and camphor, or spirits of turpentine, may be scattered over the bedclothes, or put into an inhaler with warm water, and the fumes inspired. Any of the terebinthinates may be similarly used; and solutions of either of these, or of the chlorides, may be frequently injected, or employed as gargles. The chlorate of potash, or Labarraque's antiseptic solution, may also be tried internally; and stimulating diaphoretics prescribed, early in the disease. The vapour bath, with the fumes of camphor diffused in it; the warm bath, containing a sulphuret, or consisting of water in which aromatic or stimulating herbs are infused; the nitro-muriatic acid, or chlorine baths, &c.; are severally deserving of trial. Terebinthinate embrocations, as warm as they can be endured, may also be applied externally; or turpentine may be given internally, in small and often-repeated doses, with aromatics, &c. The various means detailed in the article Fever (§ 556. *et seq.*), with reference to the treatment of the typhoid varieties, may likewise be resorted to.

16. Dr. Elliotson mentions (*Med. Gazette*, vol. vii. p. 655.) that the veterinary surgeon of the 13th light dragoons treated this disease in the horse by putting a quantity of scalded bran, mixed with Venice turpentine, into a horse-hair bag, and tying it over the horse's head; the whole body of the animal being wrapped at the same time in a large blanket wrung out of boiling water, and covered with several horse-cloths. This treatment procured a profuse sweat, and a free discharge from the frontal sinuses and nostrils, and promoted the healing of the ulcerations. Dr. Elliotson also states, in his last paper on this disease, that the sedulous injection of a solution of kréosote up the nostrils removed the whole of the symptoms, in a case of *chronic* glanders in the human subject, after a very few weeks. — Mr. Storry (*Veterinarian*, vol. vii. p. 145.) adduces cases, in which fumigation with carbonic acid gas appeared beneficial in glanders occurring in the horse; but other means, as calomel, aloes, &c., were also employed.

17. In the *chronic*, as well as in the *acute states* of the malady, *tonics* or *stimulants* conjoined with *purgatives*, particularly cinchona, or the sulphate of quinine, capsicum, and camphor, with aloes, &c.; *antiseptics*, as the chlorides, hydrochloric acid, or chloric ether, kréosote, and pyroligneous acid; warm *alterative diaphoretics*, especially guaiacum, mezereon, senega, sassafras, sarsaparilla, variously combined; the terebinthinates, balsams, &c., and fumigating or medicated warm baths; may severally be prescribed and varied, appropriately to the characters of the case. The excessive thirst always attending the disease will be most beneficially quenched by a liberal use of soda water, spruce or ginger beer, Seltzer water, &c., which may be rendered still more cooling by the addition of small quantities of nitre, or of the subcarbonates of the alkalies; or they may be made the vehicles of several internal medicines.

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GLOSSITES. See Tongue — *Inflammation of.*

GOUT. — Syn. Αρθριτις (ἀπὸ του αρθρου); αρθριτικη νουσος, Hippocrates, Aretæus. *Arthritis*, Auct. var. Ποδαγρη, Hippoc. et Aret. Ποδαγρα (των ποδῶν ἄγρα, Lucian). *Podagra*, Auct. var. Ποδαλγια, Gr. *Morbus Artieularis*, Pliny. *Chiragra; Arthritis Podagra; Morbus Dominorum; Gutta*, Radulphus, Bartholin, &c. *Febris Podagrica*, Vogel. *Podagra Arthritis*, Parr. *Arthrodynia podagrica*, Swediaur. *Cauma podagricum*, Young. *Arthrosia podagra*, Good. *Goutte Arthrite*, Fr. *Gliedersucht, gichtschmerzen, Fussgicht*, Germ. *Gotta*, Ital. *Gota*, Span.

Classif. — 1. *Class*, Febrile Diseases; 2.

Order, Inflammations (*Cullen*). 3. *Class*, Sanguineous Diseases; 2. *Order*, Inflammations (*Good*). III. CLASS, IV. ORDER (*Author*, in *Preface*).

1. DEFIN. — *Constitutional disorder, giving rise to a specific form of inflammation; often favoured by original or hereditary constitution; appearing after puberty, chiefly in the male sex; returning after intervals; generally preceded by, or alternating with, disorder of the digestive or other internal organs; and characterised by affection of the first joint of the great toe, by nocturnal exacerbations and morning remissions, and by vascular plethora; various joints or parts becoming affected after repeated attacks, without passing into suppuration.*

2. I. *Gout* is one of the diseases, the nature and treatment of which were best known to the ancients. —In modern times, however, the morbid relations and associations of the disease, and its various modifications have been more fully elucidated; and its treatment assigned accordingly with greater precision. But attempts at distinguishing its various manifestations, locally and constitutionally, and with relation to the numerous disorders arising in the gouty diathesis, have induced modern writers to make so many divisions of it, and to arrange its forms and states so differently, as to render its study somewhat perplexing to the inexperienced. This is one of the greatest objections that can be urged to the works of MUSGRAVE, GUILBERT, and some others. The arrangements adopted by some of the best writers on the disease are, however, very similar; and I will not materially depart from them. Those of CULLEN and GOOD nearly agree, and that of Sir C. SCUDAMORE and of Dr. MACKINTOSH is quite the same. Differing, therefore, but little from these writers, I shall consider — 1st, *Acute gout*; —2dly, *Chronic gout*; —and, 3dly, *Irregular gout*. — The forms described by authors, under the appellations of *regular, acute, inflammatory, chronic, irregular, nervous, atonic, lurking atonic, primary asthenic, primary fixed, anomalous, wandering, internal, visceral, retrocedent, misplaced, latent, masked, emphysematous, flatulent, disguised, aberrant, &c.*, will be appropriately considered under one or other of the above heads.

3. i. HISTORY OF ACUTE GOUT. — *A. Of the Symptoms premonitory of the Paroxysm.* — Although the gouty paroxysm may attack suddenly a person apparently in good health, especially on the first occasion of its appearance, it is more frequently preceded by symptoms of disorder referrible chiefly to the digestive organs. I believe that, if the cases in which it is said to have appeared suddenly were investigated, it would be ascertained, that more or less disorder had existed for some days before the seizure, although not so as to have excited any concern in the mind of the patient. The most common symptoms of premonition are — flatulence, oppression after a meal, irregular appetite; heartburn, with acidity of stomach, sometimes with acid or acrid eructations; costiveness, irregularity, or, more rarely, an irritable state of the bowels; scanty, deep-coloured urine, becoming turbid or thick on cooling, or sometimes copious or pale urine; a sense of soreness, or occasionally of coldness, at the epigastric region; itching, or irritation of the skin; drowsiness, or frequent yawning, restless or unrefreshing sleep, more rarely nightmare; general lassitude and depression of spirits. In some persons, the symptoms of gastro-intestinal irritation are still more manifest, the tongue being loaded, red at its point and edges, the epigastrium tender, and the stomach oppressed after a meal. In many cases, increase of corpulency; scanty, thick urine; drowsiness, especially after eating, and a sense of general fulness and oppression, have preceded the paroxysm for a longer or shorter time, accompanied by several of the preceding symptoms. The appetite is frequently craving; and when indulged, is often followed by nausea, or vomiting of acrid matter, or by heartburn, flatulency, acrid eructations, &c. The premonitory symptoms vary in different persons, and depend much upon idiosyncrasy. Dr. MACKINTOSH justly remarks, that persons subject to gout are warned of a fit by some sensation or symptom peculiar to themselves individually: one feeling heat, pain, and dryness of the eyes; another, heat, redness, and swelling of the nose; a third, an unusual craving for some particular kind of food, or some peculiar feeling at the stomach, &c. Palpitations or internal flutterings; severe cough, with mucous expectoration; irritability of the bladder, the urine being loaded with mucus; a discharge from the urethra, with scalding, or difficulty in passing the water; unusual lassitude, and inaptitude for mental exertion; peevishness, irritability of temper; depression of spirits, more rarely an unusual hilarity; and various other symptoms, severally precede the paroxysm in different cases.

4. With more or less of these indications of constitutional disorder, the patient often experiences chills or rigors, followed by heat, flushings, headach, and the sensations referrible to the part about to be chiefly affected. These sensations, however, may have already appeared; but they are now more evident, and are increased during the night. The patient complains of weakness, tenderness, achings, numbness, prickings, or shooting pains, with spasms or a tingling sensation, in the limb; or of stiffness and weakness of the joints. A dark hue of the skin; fulness of the veins; swellings of the feet after exercise; disappearance of an accustomed moisture from the soles, with remarkable dryness and heat; and frequent change of position of the legs and feet, especially in bed, with general restlessness; are amongst the more constant precursors of the fit. One or both feet, particularly the soles, and the balls of the great toes, become burning hot: sometimes, however, they are cold, and are kept warm with difficulty; frequently the chilliness and coldness of the extremities alternate with feverishness, flushings, flying pains, and vertigo. Some of these symptoms, particularly the twitchings or cramps in the limbs, are felt chiefly when about to fall asleep, and are attended or followed by restlessness or watchfulness. Local signs of premonition are most common in persons who have experienced previous attacks. Where concretions have formed, severe pricking pains, with increased tenderness, are generally present. In those of an inflammatory diathesis, or who are plethoric, exposure to cold, or other exciting causes, may induce internal disease, with all the characters of idiopathic inflammation, which may continue for a longer or shorter time, and suddenly subside, being quickly followed by a regular paroxysm of gout; such instances,

however, belong to a form of the disease hereafter to be noticed.

5. *B. History of the regular Gouty Paroxysm.—a.* The first fit of gout, although commonly preceded by more or less of the above symptoms, sometimes occurs while the patient is in apparent health; but, even in this case, there have been indications of an inflammatory diathesis, or of vascular plethora, with slight disorder of the digestive organs. Most frequently he is suddenly awakened about midnight, or at one, two, or three in the morning, with severe throbbing pain in the affected part — commonly the ball of the great toe of one foot, attended by heat, stiffness, and a sense of distension and weight. These sensations increase to burning, with an actual augmentation of the temperature of the part, and with occasional severe stounding, or darting, pains up the limb. Restlessness, watchfulness, and fever increase, or continue, till about six or seven in the morning; when a gentle perspiration breaks out, followed by abatement of the symptoms, and some sleep in the slighter cases. The integuments of the part affected are swollen, slightly red, sometimes shining as if varnished; and the veins proceeding from it are remarkably full. In severe cases, but slight remission of the symptoms occurs for two or three days. More commonly, however, the symptoms abate in the day, but return, often with increased violence, at night, or shortly before midnight, and last till about five or six in the morning; the integuments have now become of a vivid or scarlet red, and admit of slight pitting on pressure. The pain is shooting, throbbing, intense, and gnawing, with an unpleasant sense of heat, burning, or weight. The least compression or touch of the joints cannot be endured.

6. *b.* The *constitutional symptoms* of the paroxysm vary with the severity of the attack, and the previous health of the patient. Fever is generally present, and commences as stated above. It is attended by restlessness, thirst, loss of appetite, oppression at the præcordia, flatulent distension of the stomach, with abdominal pain, costive or irregular bowels, morbid evacuations, and scanty high-coloured urine, depositing a pink or brick-dust sediment after standing, and sometimes containing mucus. The pulse varies, but is generally full or hard, and quicker than natural. Pain, heat, and tenderness of the epigastrium, with spasmodic sensations referrible to the stomach, are frequently complained of, and are attended by sour eructations, or vomiting of acrid or acid matters, sometimes mixed with bile, and causing unpleasant irritation of the pharynx and fauces. The tongue is furred or loaded, the papillæ erect, and the edges and point red. The stools are offensive, mixed with mucus, sometimes pale or clayey, but more frequently foul, blackish, or of an olive green. The symptoms altogether evince more or less irritation of the gastro-intestinal mucous surface, with obstruction or vitiation of the biliary and intestinal secretions. In old cases, and in persons far advanced in life, the attendant fever is much less inflammatory, and sometimes partakes more or less of the nervous character. In most instances, the nervous system evinces disorder by irritability of temper, increased sensibility, restlessness, and darting pains in the course of the nerves, very generally attended by violent cramps, or spasmodic contraction of the muscles of the affected limb, and sometimes followed by the sudden transition of the disease from one limb to the other. Almost any change of posture produces this spasmodic action, and the severe pain attending it. Sir C. SCUDAMORE states, that of 120 cases, cramps occurred in 90, with more or less severity, either upon the accession of the paroxysm, or during its height, or at its close, or even during all these periods.

7. *c.* A first attack may *continue* from two or three days to ten or twelve. The œdema remains a short time after the inflammation, which disappears with desquamation of the cuticle of the part, and much itching. Sometimes the disease appears in the other foot, giving rise to the same succession of disorder, often with greater severity and prolonged duration. Sir C. SCUDAMORE thinks that the first attack is more frequently mild in men than in women; and states, that of 198 cases, the great toe of one foot only was affected in 130; the great toe of both feet in ten; the great toe and instep in three; the instep of one foot in five; the instep of both feet in three; one ankle in ten; both ankles in one; the ankle and instep of one foot in four; the right knee and left hand in one; the back of one hand in two; and the wrist in one; various parts of the lower extremities, especially of the feet, being affected in the rest. He further remarks, that, in hereditary gout, the great toe is mostly the part first affected; and that the exceptions to this seat of a first attack, are chiefly met with in persons who have acquired the disease.

8. *d.* The frequency of the *returns of the fit* depends upon the constitutional tendency, the treatment, and the regimen, and mode of life of the patient. Although the disease generally returns to the part previously affected, the other foot seldom escapes. Each succeeding seizure is usually more severe and of longer duration than its antecedent, and the attendant constitutional affection more serious. Exceptions, however, to this may occur when the disease has been treated with judgment, and the patient has been careful of his health. The intervals also become shorter, and the parts affected more numerous; but the fits are most apt to recur early in the spring, or late in autumn, probably owing to the variability of the weather at these seasons; but they may occur at any season. The malady generally acquires strength with each returning fit, both as to the number of parts affected, and as to the duration and degree of suffering caused by it; the susceptibility to it increasing both locally and constitutionally, with the repetition of the attacks.

9. *e.* In some persons, the gout seizes only the feet; but, in more numerous instances, in its progress, several parts are attacked in the same paroxysm; the gouty inflammation affecting different places in succession, or at the same time, with equal or various degrees of severity. The feet, ankles, knees, and elbows are occasionally thus successively or simultaneously attacked; together with the ligaments, the bursæ mucosæ, sheaths of tendons or aponeuroses. In the older cases, even the shoulders and hips are sometimes affected. The disease often suddenly leaves one part, and as instantly appears in another; but it occasionally commences in one situation before it departs altogether from the other. This rapid transfer of the morbid action

from one part to another, either of the same or of a different limb, is one of the most characteristic phenomena of gout. When it thus passes to the opposite limb or extremity, some indications of the disease have often existed previously in that part. In a few instances, the chief suffering of the patient is in the day; in others, both day and night are passed in equal pain: but in most cases, particularly in the more recent attacks, the night is the period of greatest distress.—The redness and œdematous swelling are most remarkable in the foot, hand, and elbow. In the ankle, knee, wrist, &c., there is little redness, excepting in small patches, and the swelling is caused by effusion into the sheaths of tendons, and into the bursæ; the latter often being greatly distended, painful, and exquisitely tender. In the more severe cases, the veins of the limb are large and full, and unusually numerous near the affected part. The pain in gout is peculiar — is severe, burning, throbbing, shooting or stounding, and otherwise modified in different cases, as stabbing, cutting, boring, or gnawing.

10. *C.* The *Sequelæ of Acute Gout* respect — 1st. The effects of the disease in aggravating previous derangement, or inducing disorder of internal organs; and, 2d. The alterations produced by it in the part affected. — *a.* Severe attacks of gout impair vital power in the digestive, biliary, and nervous organs; or they may be said, with greater accuracy, to weaken still more the previously debilitated organic nervous influence. Hence occasionally result a numerous train of dyspeptic symptoms; hypochondriasis and torpid or otherwise deranged function of the liver; inaction of the cæcum and colon, causing a sluggish state of the bowels and morbid evacuations; increased liability to apoplectic and paralytic seizures, or to cramps, wandering pains, &c. Sydenham supposed that gout disposed to the formation of urinary calculi; and numerous cases have been recorded in which either they or gravel in the urine alternated with the gouty paroxysm. This connection has received support from the observations of Morgagni, Schurig, Buechner, Shroeder, Mursinna, Heim, and Forbes; but Sir C. Scudamore states, that irritation of the urinary organs and gravel occur rather before and during the paroxysm, than in the interval; and that calculus of the bladder is a very infrequent complaint amongst gouty persons; of 231 of whom, five only were so afflicted. This, however, does not altogether disprove the connection; as renal calculi may have existed in some, if not in many of these. He, however, adds, that the urine of gouty persons deposits, without any exception, at some period or other, either gravel or the pink or brick-dust sediment. There can be no doubt that the gravel is formed either in the kidneys, or in the urinary bladder; and if this be granted, a strong argument will be thereby furnished in favour of the occasional supervention of calculi.

11. *b.* The most frequent consequence of acute gout, as respects the local affection, is the passage of it into the chronic form; but before this degeneration may have taken place, several lesions of the tissues composing the part affected may be produced by acute attacks. These are — weakness, stiffness, and lameness of the joint, with a snapping or grating sensation upon motion, owing to imperfect secretion of the synovial fluid. The ligaments and muscular aponeurosis become thickened, stiff or inelastic, and tender. The secretion from the sheaths of the tendons is thickened or otherwise vitiated, causing a knotty and thickened feel upon examination, sometimes with contraction and rigidity. The bursæ mucosæ are enlarged, and either distended, or soft and yielding to the touch. The contents of the small bursæ are sometimes inspissated so as to form hard tumours; and the deep-seated textures of the joints become thickened and apparently consolidated. The veins of the feet and legs are often either enlarged or varicose; but these, as well as various other changes, as concretions, &c., are chiefly the result of the chronic disease.

12. ii. Chronic Gout. — *a.* This state of the disease is *characterised* by the inflammation and pain being more slight, irregular, and wandering, than in the acute; by the faint redness of surface, the permanent distension and œdema of the part; by impaired power of motion; by its more continued duration, and association with disorder of the digestive organs; by the languid or oppressed circulation; and by general irritation of the nervous system. It is generally a consequence of one or more acute attacks, either when the paroxysm has not passed off with a regular crisis or evacuation, or when repeated seizures have so enfeebled the constitution as to render it incapable of manifesting sthenic action. It may, however, appear primarily, constituting the *Primary Chronic Gout* of J. P. Frank. In this case, instead of severe paroxysms occurring at distant intervals, the seizures are much milder, but much more frequent, prolonged, and irregular. Primary chronic gout is more common among women than men — and in them, especially, seldom affects the great toe; sudden swelling, and pain, with but little of the appearance of the gouty inflammation, affecting chiefly the instep or ankle, or the wrist or hand. When chronic follows acute gout, the various parts which had been inflamed in the paroxysm of the latter, continue affected, either alternately or in conjunction; but the pains are more wandering, and have now and then a rheumatic or nervous character.

13. *b.* Whether primary or consecutive, *chronic gout* presents the following *local symptoms.* — A sense of alternate heat and coldness is felt in the affected part, and is much increased at night. There are often numbness and an uneasy sense of fulness and weight. The muscles and joints feel weak, and cramps of the lower limbs occur chiefly at night, when falling asleep. Startings and restlessness are generally also complained of. The surface of the part is either of a pale reddish colour, or of the natural hue, or of a purplish tint, the discoloration being sometimes transient. The parts are tender; shooting pains pass along the nerves; motion is difficult and painful; and the energy of the limb very much impaired. The bursæ and the sheaths of tendons are more frequently affected in the chronic than in the acute gout, occasioning puffiness and distension. Œdema is generally present and permanent, attended by fulness of the veins. Even in the slightest cases, aching and a sense of heat are felt in the ankles after walking.

14. *c.* The *constitutional symptoms* are remarkably diversified by the temperament and habits of the patients, the situation and degree of the

local disease, and by the nature and extent of the internal associated disorder. Numerous dyspeptic symptoms and uneasy sensations referrible to the stomach,—as craving for food, nausea, oppression after a meal, flatulency, heartburn, a sense of coldness at the stomach, transient pains, or spasms of the muscles of the abdomen or chest; a costive or irregular state of the bowels, with morbid or offensive stools; a deficient or unhealthy biliary secretion; and hæmorrhoids, with evacuations of blood; are often present. Feverishness or irritation follow too full a diet, or stimulating food; and a sallow or slightly yellow cast of countenance, with uneasiness or pain in the hypochondria, and deficiency of bile, are not infrequent. The urine is various, being sometimes scanty, high-coloured, or thick, or occasionally abundant and dilute: it generally deposits a pink or lateritious sediment. Palpitations and flutterings of the heart are very common, particularly when there is much flatulence. Sleep is broken, disturbed by unpleasant dreams, and unrefreshing; the temper is irritable, and the mind hypochondriacal, imaginary or trifling ills occupying the attention. In some cases, a chronic dyspeptic cough, or an increased secretion of mucus in the trachea, is complained of. Many persons, especially females, are exquisitely sensitive, and have their ailments increased by vicissitudes of atmosphere, especially by cold and humidity. In prolonged or severe cases, the system often becomes cachectic; the limbs weak, stiff, and wasted; and the abdomen large. Although the patient's appetite may be natural, yet he is neither nourished nor strengthened by his food, which may even increase both the constitutional and local affection.

15. *d.* The *concomitants or consequences* of prolonged chronic gout are, thickening and consolidation of the tissues of the affected part. The veins of the limb often become varicose, and increase the achings and fulness of the part, or cause purplish blotches of the surface, and, although rarely, ulceration of the skin.—*Gouty concretions* occur only in a few cases, and arise from the effusion of a whitish fluid, the watery portion being absorbed. Mr. Moore remarks, that this effusion occurs not only during the fits, but also in the intervals; that it is not enclosed in a cyst, but usually lies in the cellular membrane, in the bursæ mucosæ, or in the cavities of joints. In the sheaths of tendons, these concretions are generally hard or stony; in the bursæ, they are likewise hard; and in the cellular tissue, their consistence varies. They may also form between the cuticle and cutis; where they vary in consistence, or even occasion intractable deep ulcers, as in a case related by Mr. Herbert Barker. When they are situated within the capsular ligaments, the cartilage is absorbed, and one or more phalanges distorted. Sir C. Scudamore mentions several such cases. When the concretions cause ulcerations, the chalk-like matter is constantly secreted in a fluid or semifluid state, and accumulates in the bottom of the ulcers.* The surrounding surface is usually of a red colour, shining, and the seat of severe burning pain—symptoms occurring in paroxysms, with remissions or intervals of various duration. In such cases, erythema or erysipelas may be associated with the local affection. Although the concretions generally appear in the joints and surrounding tissues, they may occur in other situations, either simultaneously, or otherwise. Morgagni mentions their formation in the breast of a patient suffering from hereditary gout. In the case detailed by Mr. Barker, there was a gouty concretion of the size of a horse-bean deposited on the left side of the nose. Dr. Elliotson met with a case in which they formed in the ears. Their chemical constituents seem to be lithic acid combined with soda, potash, or ammonia, but mostly with soda, and with a little animal matter. They are of a light, or whitish grey colour; insoluble in cold, and partially soluble in boiling water.

16. iii. Irregular Gout.—Under this head may be arranged the various states of disorder, either occurring in the gouty diathesis, or connected with the appearance of the gouty paroxysm, or following its sudden cessation in an external part. In this extended acceptation of the term, *irregular gout* will comprise the brief consideration of those derangements to which the names *anomalous, imperfect, internal, visceral, misplaced, displaced, retrocedent, transferred, metastatic, wandering, flying, disguised, masked,* &c. have been applied. I shall, therefore, consider—1st. Those specific or anomalons disorders appearing in the gouty diathesis, and followed by a complete or imperfect external gouty affection;—2dly. The derangements consequent upon the sudden cessation of the gouty paroxysm;—and, 3dly. The various anomalous or disguised affections afflicting persons of the gouty diathesis, without being followed or attended by any manifestation of external disease. It has been urged by some modern authors, and even by the latest writer on gout, Dr. Barlow, that several of the forms just alluded to are merely internal disorders occurring in gouty persons, and differing, in their nature and treatment, in no respect from those usually observed; or, in other words, that these internal affections possess no specific gouty character. This is true in one point of view only, but not in others; for it must be admitted that the gouty are even more liable to internal diseases than healthy persons, and that these diseases will often pursue the usual course in the former as well as in the latter. That the gouty are very liable to nervous and functional disorders, especially those implicating the digestive and excreting functions, and that those disorders often present nothing peculiar, are generally admitted; but that many of the affections which either precede or follow the external manifestation of gout, or that appear in the gouty diathesis, differ very materially from those observed in other persons, is shown by the following circumstances:—1st. Gouty inflammations of the eye are very different in their visible characters, their seats, and their consequences, from common ophthalmia; and every one possessed of due powers of discrimination, will

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* "An officer of temperate habits, who had undergone much active service, was, for some years before his death, ætat. 45, much affected with gout: many balls of chalk were removed from his hands, and he could write on the table with the point of his finger. Ulcers had also formed on his feet, which usually discharged an ounce of fluid chalk in the 24 hours." (*Catal. of Prepar. &c. in the Museum of Fort Pit,* &c. p. 167.)

admit that they require a different mode of treatment. 2dly. The knowledge we possess, however imperfect it may be, as to the changes and appearances consequent upon fatal internal disease in gouty persons, is conclusive of a material difference between them and those following more common maladies; and, 3dly. The *juvantia* and *lædentia* in the former are often very different from those in the latter.

17. *A. Specific or anomalous affections often precede* the external manifestation in a complete or imperfect form of acute or chronic gout. They may be either in every respect similar to other affections of the same seat, or very different and peculiar. In the former case, the external appearance of gout seems critical, and has been viewed as such by many writers; in the latter, it appears as the external manifestation of a constitutional disorder previously implicating the functions or sensibility of one or more internal organs. —In perusing the older writers, numerous instances present themselves of gout supervening upon, and appearing critical in, inflammatory and severe internal complaints. Morgagni considered himself cured of an ophthalmia that had resisted treatment, by an attack of gout. Dr. Baillie mentions a case of palpitation of the heart disappearing upon the occurrence of the gouty paroxysm; but these are not rare occurrences. Indeed, palpitations of the heart are frequently symptomatic of the disorder of the digestive organs ushering in the seizure. Affections of the urinary organs, erysipelas, asthma, and other diseases, have likewise been removed by a regular fit of gout. One of the most interesting illustrations of the succession and critical influence of gout upon dangerous internal disease, occurred to a medical gentleman whom I attended in 1824. He was seized in the evening with symptoms of complete congestive apoplexy, for which he was bled and purged, but without restoration of his consciousness. On the following morning, gout suddenly appeared for the first time, with great intensity in the ball of the great toe of the right foot, and instantly removed all the apoplectic symptoms, the mental functions being perfectly clear and undisturbed on my seeing him very shortly afterwards. When gout assumes a regular character, such antecedent affections appear merely as unusual precursors of the paroxysm, ushering in either the first seizure, or an attack in persons who had been previously affected by it.

18. *B. Retrocedent or displaced Gout — recedent, or transferred, or metastatic Gout — Podagra retrocedens — P. retrograda,* Cullen — *P. complicata,* Good. — *a.* During the gouty paroxysm in either its acute or chronic form, it sometimes happens that an internal organ becomes suddenly and dangerously affected, the external disease being either much mitigated, or having entirely disappeared. It has been disputed whether the internal disorder arises from the suppression or subsidence of the external affection, or whether the latter disappears in consequence of the occurrence of the former. Either may take place, as evinced by the succession of morbid phenomena, in different cases: the development of disorder in an internal organ, deriving it from external parts in some instances; and the suppression of the external manifestation of a constitutional disease, determining it to an interna predisposed viscus in others. When retrocession occurs in the height of an acute paroxysm, the superinduced malady is generally also acute, and rapid in its course; but when it takes place in the chronic form, it is often less severe and more prolonged. The internal affections, which thus arise, are generally caused by the patient's imprudence, by his habit of body and temperament, by previous disorder, or by injudicious treatment and management. The stomach is most liable to be affected, severe pain and spasm, with sickness, being complained of. The intestines may be also attacked, either alone or in conjunction with the stomach, with all the symptoms of acute inflammation; either form of disease often pursuing a violent or rapidly fatal course. Severe pain in the head, and symptoms of inflammation of the brain and its membranes, stupor, coma, apoplexy, epilepsy, or palsy, supervene in some cases, especially in those who have previously evinced a tendency to these maladies. In other instances, affections of the chest appear; particularly dyspnœa, sense of suffocation, oppression at the præcordia, with or without cough or expectoration. In some, pain or constriction in the region of the heart, violent palpitations, oppressed breathing, urgent anxiety, syncope, or leipothymia, &c. occur, indicating a serious affection of the heart or pericardium. In a case of this description recorded by Mr. Brown, and which terminated fatally some months after the disappearance of gout, the pericardium was thickened, and containing six ounces of bloody serum; the heart was greatly enlarged, and its substance was pale, soft, flaccid and attenuated, its internal membrane being of a deep violet colour; honeycombed ulcers were also observed at the root, and in the arch of the aorta. Other diseases of an inflammatory, spasmodic, or nervous character, or of these mixed, may follow the disappearance of the external gouty affection, more particularly dysentery, hepatitis, peritonitis, and various affections of the urinary or uterine organs. Dr. Cullen mentions strangury, catarrhus vesicæ, and hæmorrhoidal affections, amongst those not infrequently alternating with gout; and instances have occurred to myself, as well as to Sir C. Scudamore, Mr. Howship, and many others, of the transference of the morbid action to the kidneys, causing suppression of urine, or inflammation with partial suppression; or to the neck of the bladder with severe spasm, or even to the prostate gland. Mr. Howship mentions, that when gout is transferred to the kidneys, the urine becomes albuminous, as well as scanty. Dr. Home states, that a gentleman, who exposed himself to cold and wet, whilst affected by gout in the feet, was in a few hours afterwards affected by enteritis, which proved fatal in twelve hours; and Sir C. Scudamore mentions, that Dr. Parry met with two instances of extravasation in the brain in the same winter, after repelling gout from the extremities by immersing them in cold water.

19. *b.* The information we possess as to the lesions produced by the transference of the morbid action to an internal part, is extremely imperfect; many who have the opportunity, not giving themselves the trouble to inquire respecting them, or supposing that little or no alteration may be expected in such cases. Others, again, believe that

the changes consist chiefly of those produced by inflammatory action. Without disputing that the consecutive affection is frequently inflammatory, I have seen it, in several instances, possessed of a distinctly nervous and spasmodic character, or consisting chiefly of remarkable depression of power, with the abolition of the function of the organ principally affected, and most intense suffering. A medical friend, some years ago, whom I attended in the disease, took, contrary to my wish, and previously to removing biliary accumulations and morbid excretions, a large dose of colchicum; and was very shortly afterwards seized with violent pain in the stomach, a sense of sinking, and languid small pulse, the gout having instantly disappeared from the foot. I soon afterwards found him in the utmost agony, and prescribed large doses of camphor, with other diffusible stimuli, and mustard cataplasms to the feet. The gout as instantly returned to the extremities, and the affection of the stomach disappeared. A medical man, lately resident in Crawford Street, experienced, in 1830, an imperfect attack of gout in the feet. When I saw him, it had just forsaken this situation, and in twenty-four hours it successively had attacked the bowels, in the form of most violent colic, the diaphragm, and lungs, causing the most urgent dyspnœa; and lastly, the head, in a slight degree. The disease then appeared in one foot, and afterwards transferred itself to the other. In these cases, the phenomena of internal disorder were those of severe nervous affection, probably also connected with congestion, or irregular determination of blood; and the treatment founded on these views procured relief in them all.

20. Formerly, the internal affections thus connected with the disappearance of gout, were too exclusively viewed as nervous, and treated as such, notwithstanding the indications of inflammatory action sometimes attending them. More recently, and even at the present day, a very opposite opinion has been promulgated. Dr. GREGORY, of Edinburgh, supported this latter opinion, and was followed in it by Dr. BATEMAN and Dr. BARLOW. Fully admitting the inflammatory character of these consecutive affections in some cases, I must strenuously contend that it does not constitute the principal feature of them in others. In several instances, three of which occurred in medical men in this city, an inflammatory state could not be inferred either from the sensations of the patients, or from any symptom that I observed; and as the treatment founded upon the gouty and nervous characters of the disease was successful, there is no reason to infer that a latent inflammation had existed in these cases. That inflammatory and congestive affections of various internal viscera often occur, in such circumstances, cannot be disputed; but the practitioner should be prepared to meet also with very different and often anomalous disorders — to find some attended by the most intense suffering and distress; others by a feeling of sinking or dissolution; others by distressing anxiety, terror, and irritation; others by spasmodic action and morbid sensibility; and, lastly, others by constant pain, internal heat, distension, tenderness, and other indications of inflammatory action. In some, the pulse is weak, irregular, fluttering, small, or intermittent; in others, excited, frequent, irritable, but regular; or full, strong, and energetic. I have even seen it all these in succession, in the same retrocedent affection, and within a few hours. Some cases, even where the same organ is implicated, are attended by constant pain, a sense of increased heat, or of burning, remarkable tenderness, and excited pulse; and others, by remarkable depression, great languor, a sense of coldness or of weight, or oppression, a weak and languid pulse, and a feeling of vital exhaustion and of impending dissolution. Of the pathological relations of these different morbid conditions, more particular notice will be taken hereafter (§ 40—42.).

21. *C. Disguised or lurking Gout — anomalous, imperfect, internal, visceral, nervous, masked, or misplaced Gout — Podagra atonica,* CULLEN — *Podagra larvata,* GOOD.—The gouty diathesis may be generated in a constitution too weak to develop the local affection in the extremities. When this is the case, various disorders affecting internal organs, most frequently those of digestion and excretion, arise, and often assume anomalous or Protean forms, with functional or nervous characters, and even congestive or inflammatory states, as in retrocedent gout. In that variety, the internal disease is preceded by, and is rapidly consecutive of, the disappearance of an external gouty affection; but this variety is frequently unattended by any such affection, however slight or fugitive, although it may occur. It has been too generally inculcated, that the disorders appearing in the gouty diathesis have nothing peculiar in their character, or different from those observed in other circumstances. This subject has been already sufficiently adverted to, with reference to retrocedent gout; and the observations there made are equally applicable to those affections which appear in the lurking or disguised manner now being considered. When, in connection with the generation of the gouty diathesis, the constitutional powers have been greatly impaired, and the functions of excretion weakened, numerous internal disorders result, whether the patient may have experienced a fully formed fit of this disease or not. A fastidious or impaired appetite; a sense of distension and flatulence; acid or acrid eructations, or nausea or vomiting; spasmodic constriction, or most painful oppression at the epigastrium; costiveness and violent colic; mental depression, anxiety, or hypochondriasis; palpitations, or other irregularities of the heart's action; hemicrania, vertigo, and various affections referred to the head, or even palsy, epilepsy, or apoplexy; nervous excitement and irritability, with a sense of depression, and several other affections; sometimes present themselves, either with or without slight manifestations of gout in one or other of the external situations above enumerated. That those complaints are favoured by, and very often occur in, the gouty constitution, cannot be, and, indeed, is not, doubted. The question only is, whether these be of an inflammatory, or of a nervous, or of a mixed, or of a specific or peculiar character. That they are functional, chiefly, cannot be disputed; but that others of a more decidedly inflammatory or congestive kind may occur, as in cases of retrocedent gout, seems to be most consonant with the phenomena observed in different cases, and with the pathology of the disease, according to the view of it hereafter to be exhibited. Dr. HAYGARTH

has recorded two most interesting instances of misplaced gout, causing arthritic carditis in the one case, and enteritis in the other; and, although an attack of gout had not been experienced for many years, moderate depletions, and sinapisms applied to the extremities, were followed by the external gouty disease.

22. It is not unusual to hear persons who are advanced in life, and who have ceased to have their usual attacks of gout, complain of various nervous or functional disorders of so remarkable and peculiar a kind, as to convince them that gout is affecting or wandering through the system without developing its usual effects. Sir C. Scudamore very justly observes, that some gouty persons are affected with severe colic upon accidental exposure to wet and cold, or from acid or indigestible articles of diet; and that almost invariably these attacks are spasmodic and not inflammatory; hot brandy and water, or compound spirit of ammonia, giving relief. It should, however, be recollected, that the continuance of pain may cause congestion of, or inflammatory determination to, the affected part. The internal complaints occurring in the gouty diathesis are generally attended by sensations so distressing, and often so peculiar, as to excite suspicions of their nature in the mind of the patient, and to cause him to desire an attack of gout, however severe, in the extremities, believing that it will remove the internal and more dangerous sufferings. Sir C. Scudamore defines these affections "to be disordered functions of internal organs in a gouty constitution, and thereby modified in their character;" and in this opinion he has been followed by Dr. Barlow and others. Dr. Cullen, and those who preceded him, distinguished these complaints by the term "misplaced gout;" and, as it will appear in the sequel, the difference between the ideas intended to be conveyed by these terms, is more apparent than real; for the one, in admitting that such complaints are modified by the gouty diathesis, concedes all that is contended for by those who distinguish them by applying to them, without circumlocution, a term indicating at once their most important features and relations.

23. II. Diagnosis.— *A. Acute Gout* may be mistaken for *acute rheumatism*, which it may approach more or less near, when the latter affects the joints; or for common inflammation of these parts.—It seldom happens that more than one part is affected, and still more rarely that more than one is attacked at the same moment, in the first fit of gout. This character, however, cannot be extended to acute rheumatism. In the former, there is much more disorder of the digestive organs precursory of the attack, than in the latter, and the remission from pain and fever, during the day, is much more distinct. In *gout*, serous effusion into the cellular tissue is early in the fit, and to the extent of admitting of slight pitting on pressure; the veins are turgescent in the vicinity of the affected part; the pain is pungent, severe, burning, stounding, lancinating, or peculiar; the surface is inflamed, deeply red, shining as if varnished, turgid, and exquisitely tender; the temperature of the part is very much increased; and the urinary secretion is remarkably disordered, generally depositing a quantity of the pink or lateritious sediment, consisting of the lithate of soda, the tinging substance being the purpurate of soda. These symptoms are either absent or slightly marked in acute rheumatism.

24. The hereditary character of gout; the frequency of it in the plethoric, sanguine, and irritable constitutions, and at an advanced age; the sudden incursions of the fit; and the commencement of it in the small joints; further serve to distinguish it from rheumatism. Although gout may affect the knees, shoulders, elbows, &c., after repeated attacks, or in its chronic form, it rarely commences in these situations; whereas rheumatism generally begins in the shoulders and larger joints.—It is sometimes, however, observed that the patient, on recovering from the one disease, may be attacked by the other, upon exposure to its exciting causes; and a person, who early in life has lived frugally and laboriously, and been subject to attacks of rheumatism, has, at a more advanced age, lived fully and indolently, and been attacked by gout. In either case, the patient himself has no difficulty in distinguishing between them; and the experienced practitioner will have as little, however much he may be at a loss to convey his ideas respecting their diagnosis to others. It is not so much by any one mark, as by the concurrence of several circumstances, connected with the causes, the constitutional disturbance, antecedent and existing, and with the local characters, that a correct diagnosis can be formed. *Common inflammation of the joints* cannot be mistaken for acute gout, if the character of the pain, the state of constitutional disorder, and the urinary secretion, receive attention. The continued or unremitting state of the symptoms, and the course, progress, and termination of the disease, will also serve to distinguish them.

25. *B. Chronic Gout* may be distinguished from *chronic rheumatism* by several of the circumstances already adverted to.—The former is much more frequently preceded by the acute disease, and by disorder of the digestive and excreting functions, and is very much oftener attended by swelling, thickening, or nodosity of the affected parts, than the latter. However, cases not infrequently occur, in which gout, in its more chronic form, very nearly resembles chronic rheumatism, there being but little disorder of the above functions attending them. In forming a diagnosis, the temperament, habit of body, age, and mode of living should be taken into consideration. Dr. Haygarth observed, that only 14 patients out of 300 ill of chronic rheumatism had swelling in the seat of disorder. It should, however, be recollected, that when chronic rheumatism affects the bursæ mucosæ, and thecæ of tendons, particularly those of the knee joint, considerable tumefaction takes place. Although the gout, in its chronic form, is still more fugitive than when acute, and thus approaches nearer to the nature of rheumatism, yet it is much more disposed to seize the hands and feet than that disease, as well as to be more solitary in its situation. The parts which have been often affected with gout become very susceptible of changes of temperature; and, in this respect, partake of the rheumatic character. Sir C. Scudamore thinks that it is only in this way that any propriety can be attached to the expression *rheumatic gout*; and conceives that gouty and rheumatic inflammations cannot both exist in the same part at the same time, although they may occasionally co-exist in different parts; as when a

patient suffering gout in the usual situations is seized with rheumatism in the muscles of the neck, or in the shoulder, or other parts, in consequence of exposure to currents of cold air, &c. When gouty concretions form, the nature of the complaint will be sufficiently evident.

26. *C.* It is a matter of great difficulty to discriminate between the internal affections characterising *irregular gout*, and similar affections unconnected with this disease, as may be inferred from what has been already advanced on the subject. It is only by applying sound principles of pathology to the investigation, guided by much acumen and experience, that we can expect to distinguish between them. When called to a patient advanced in life, of the irritable and nervous temperament, complaining of violent sufferings, or of various nervous and functional disorders, or of severe spasmodic affection, we should endeavour to ascertain, from the state of the pulse and the temperature of the surface, from the sensations produced by a minute examination, from the appearances of the excretions, and from the history of the case, especially with reference to its causes, and to previous attacks of gout, and to any hereditary predisposition to it, the exact pathological condition upon which the symptoms depend. The existence or non-existence of inflammatory action, or the degree in which either may be mixed up with spasm, or morbid sensibility, should be ascertained. Many writers, both previous to, and contemporary with, Dr. CULLEN, considered debility and spasm, with altered sensibility, to be more characteristic of retrocedent and misplaced gout, than inflammatory action; and this opinion seems to have been too generally and often injuriously adopted. But I am convinced, that, in more recent times, the opposite doctrine has been too exclusively confided in, and with little less injury as to the results.—The practitioner, in all such cases, should be guided by pathological inferences derived from the phenomena characterising individual cases; and if he find the pain fixed, the pulse excited, or hard, or oppressed, the skin hot, and the parts tender or painful on pressure, he will deduce the existence of inflammatory action: whereas, if the pulse be weak, small, irregular, or indistinct, and compressible; if the skin be cool, the countenance collapsed or anxious; the surface relaxed and perspirable, the parts tolerant of pressure, and if no unnatural sound be detected on auscultation and percussion; he will infer the presence of functional disorder merely or chiefly, or of spasm, or of depression of nervous power with altered sensibility.

27. III. PROGNOSIS. — The prognosis should vary with the form which gout assumes. — *A.* In the *regular acute disease*, a favourable opinion may generally be given, if the internal organs betray no serious lesion of function or of structure. The subsidence of sympathetic fever; improvement in the excretions, the urine ceasing to deposit a sediment, or losing its high specific gravity; a return of the appetite, and of the spirits; desquamation of the inflamed cuticle, with disappearance of the swelling; are indications of recovery. The sudden transference of severe affection from one part to another, especially if accompanied with painful sympathy of the digestive organs, or with nervous symptoms and exquisite susceptibility, or with irregular fever, and with persistent disorder of the excretions, are signs of a difficult and intractable disease. In this form of gout especially, the prognosis should be influenced chiefly by the state of the excretions; for as long as the stools and urine continue morbid, other signs of amendment will prove delusive.

28. *B.* The prognosis in *chronic gout* is more unfavourable than in the acute, as respects subsequent immunity from the disease. As to recovery from the seizure, the circumstances just stated will influence the opinion of the practitioner, as in the acute variety. In every case, however, the state of constitution and of internal organs, and the effects produced by treatment, should be taken into account, in deciding respecting the duration or the event of the disease. — *C. Internal affections* occurring either in the gouty diathesis, or upon the sudden disappearance of the external disorder, are always unfavourable in proportion to their severity, and the vital importance of the parts in which they are seated. When the heart, the brain, or the stomach and intestines, are the seats of *retrocedent* or *misplaced gout*, the patient should be always considered in the utmost danger; especially if he be far advanced in life, if nervous energy be much impaired, and if judicious treatment has not immediately produced the desired effect. Cases of this description, however, not infrequently recover when appropriate and decided means have been promptly resorted to, and when the constitution of the patient has not been remarkably injured.

29. IV. CAUSES OF GOUT. — i. *Predisposing Causes.*—These may, as in other diseases, become exciting causes, owing to continued or energetic action. — *a. Hereditary disposition* has always been viewed as most influential in the production of gout. CADOGAN, however, attached too little importance to it, and CULLEN too much. It is very probable that it will evince various grades of influence in different classes or states of society; —that it will seem of greater importance in those who live regularly, soberly, and laboriously; and of much less, in those who are indolent, luxurious, or dissipated. Sir C. SCUDAMORE states, that of 213 persons afflicted by gout, 84 could not trace it either to the father's or mother's side. But it is probable, conformably with what has been just stated, that an unusually large proportion of non-hereditary cases will be met with amongst the indolent and luxurious inhabitants of a large metropolis. Of the hereditary cases, 62 were derived from the father, 29 from the mother, 14 from both father and mother, 14 from the grandfather, &c. When both parents have had the disease, a greater number of the children will experience it. Where one parent only has had it, the child or children having the greatest resemblance to that parent will be most liable to it.

30. *b. Adult age*, particularly from 25 to 50, is the period at which gout most frequently first appears. Sir C. SCUDAMORE states, that of 209 cases, 25 had the first attack between 20 and 25 years of age; 38 between 25 and 30; 41 between 30 and 35; 37 from 35 to 40; 18 from 40 to 45; 25 from 45 to 50; and 11 between 50 and 55. Gout is rarely met with before puberty. HIPPOCRATES first stated this fact, and it has been confirmed by SYDENHAM and many other writers. HEBERDEN never saw an instance of it. Dr.

SCUDAMORE mentions a case at 8 years of age. I treated one, many years ago, at 11; and am at present attending a boy of 9, recovering from a severe attack in the foot. Very early seizures have generally been observed where the hereditary predisposition has been strong. In the two cases just alluded to, it existed in both parents; and, in one of them, there was great precocity of intellect. In some cases, where the disease appeared very soon after puberty, premature or excessive venereal indulgences seemed to me to have aided in its production.

31. *c.* The *male sex* is much more disposed to gout than the female.—HIPPOCRATES mentions the non-liability of females until the cessation of the menses. This, however, is not correct; for cases occur at an early age in the plethoric through indolence and high feeding, and in those who have not had children. I met with an instance of it in a female of 27 years of age, who was thus predisposed. Dr. GREGORY observed, in his Lectures, that females subject to gout had experienced menorrhagia, or had become plethoric from ingurgitation; and Dr. CULLEN has remarked, that robust and masculine females, before the menses have ceased, or those in whom they have been very abundant, are not infrequently attacked. The instances of gout which I have seen in this sex, previously to the change of life, have been chiefly in those who had suffered frequent or excessive menstrual evacuations, who had lived very fully and indolently, and who had not been pregnant. The relative immunity of females is evidently owing to their temperance, to their periodical evacuations, and to the discharges and secretions connected with child-bearing.

32. *d. Habit of body and temperament.*—Gouty persons are said to have capacious and circular chests, with large full veins, and loose solids; but to this rule there must evidently be numerous exceptions. SYDENHAM remarks, that the gross and corpulent, and those with large heads, are most frequently affected. J. P. FRANK states, that the *gouty conformation* consists of a large and full body, voluminous head, large bone, and thick skin. Sir C. SCUDAMORE found that, of 226 males, 64 were tall and corpulent, 41 middle height and corpulent, 25 short and corpulent, 28 middle stature and bulk, 14 tall and middle bulk, 21 short and middle bulk, &c.; and that of 28 females, 9 were tall and corpulent, 8 short and corpulent, 4 middle height and corpulent, and 4 short and slight. Corpulence usually precedes the disease, and often increases with the progress of it. The gouty generally possess good constitutions, abused by indulgence. The sanguineo-nervous and irritable *temperaments* are the most liable to be attacked by gout, although other diatheses may be also affected. — CADOGAN ascribed gout to three causes, which generally act conjointly; namely, *indolence*, *intemperance*, and *vexation*. Taking these in their wide signification, their importance cannot be controverted. In whatever *station of life* they prevail, particularly indolence and intemperance, gout will appear as one of the most frequent results; hence it is not infrequent in butchers, innkeepers, and publicans; and in butlers, coachmen, and porters in wealthy families, as well as in the more easy classes of society. It is, in short, met with in all occupations which conduce to inactivity and repletion.

33. *e. Venereal excesses* are amongst the most unequivocally predisposing causes, especially if associated with the intemperate use of animal food and of wine; for whilst the former species of excess exhausts the nervous power, the latter occasions plethora, and both combine to impair the functions of digestion, assimilation, and excretion; hence the ancients said that gout was the daughter of Bacchus and Venus. The wines which favour most the production of gout, are champagne, new port, and the clarets; but other wines have more or less influence, and are more productive of the disease than malt or spirituous liquors. Strong malt liquor disposes to it even more than spirits. Dr. CULLEN justly remarks, that gout never attacks those following laborious occupations, or who live chiefly on vegetable food, or use neither wine nor other fermented liquors. SCHENCK, VAN SWIETEN, and other authors, have adduced numerous instances of persons, who, during a life of luxury and indolence, had been subject to this disease, but had never afterwards suffered from it when their circumstances required them to live abstemiously and laboriously. In countries where animal food, and vinous or intoxicating liquors, are little used, gout is almost unknown. The habit of partaking of a great quantity or variety of animal food is not less influential than other kinds of intemperance in causing the disease. Severe study has been considered to predispose to it; but this cause is merely apparent or indirect, others of a less doubtful kind also existing. The depressing passions are not without influence, inasmuch as they weaken nervous energy and the functions of digestion and excretion. A cold and variable climate favours, also, in some degree, the formation of the gouty diathesis; and the changeable weather in spring and autumn, and the cold winds and humid atmosphere of these seasons, have a similar effect. The disease is comparatively rare within the tropics, unless amongst those who have indulged in those habits which are most influential in predisposing to it; and yet two of the severest cases I ever saw, occurred nearly under the equator in Africa.

34. *f.* Functional disorder of the digestive organs is one of the most universal causes of gout. Many of the causes already noticed, and of those about to be mentioned, act partly by weakening these organs, and favouring congestion of, or inflammatory determination to, the mucous surface. It is not, however, a state of inflammation of this surface, but rather of vascular erethism, that is thereby generated. Hence the appetite, instead of being impaired, is often increased; and the patient is prompted to take more food than the stomach and collatitious viscera can digest and assimilate. When the appetite is impaired, owing to the digestive mucous surface having assumed a more inflammatory state, frequent attempts are but too often made to excite it by stimulating and savory articles of diet; and the mischief is thereby augmented. Even where functional disorder only exists, inflammatory irritation is superadded, attended by the severer symptoms of indigestion — by acrid eructations; by painful distension and soreness of the epigastrium; by congestion and impaired action of the liver; by interruptions of the passage of bile into the duodenum, accumula-

tions of it in the gall-bladder and ducts, and a redundancy of its constituents in the blood; by acidity of the *primæ viæ*, and an imperfectly elaborated or unhealthy chyle; and ultimately, as will be hereafter shown, by a morbid state of the circulating fluids. But these are merely accessories to the formation of the gouty diathesis; other conditions, particularly vascular plethora, being also required; and this state, with the various other elements of the gouty constitution, is that which is generated, in a greater or less degree, by the causes now passed in review.

35. ii. *Exciting Causes.*— Whilst the foregoing causes act chiefly in generating the gouty constitution, or predisposition, those about to be mentioned are mainly concerned in exciting or developing the paroxysm. The sudden repletion and inflammatory excitement of the vascular system in connection with irritation of the digestive mucous surface, produced by excessive indulgences at the dinner table, frequently occasions a fit in a few hours, when the morbid diathesis is already formed; and, when the excess is repeated, particularly in quick succession, the morbid effect rarely fails to take place. Champagne excites an attack more certainly than any other wine. A lady under my care, and who had not passed her 30th year, always suffered more or less on the following day, after taking a single glass of champagne; but the excessive use of any wine, especially if new or of inferior quality, will produce a seizure. The use of malt liquor during dinner, and of port wine afterwards, will excite it, if active and regular exercise be not taken. Strong malt liquors and spirits will often have a similar effect, especially if much animal food be habitually eaten. It is not only indulgence in wine or other exciting liquors, or the admixture of them, that is injurious; for a great quantity and variety of animal food, and of highly seasoned dishes, which they excite the stomach to receive until it is overloaded, are equally prejudicial. Acidity of the *primæ viæ*, from the imperfect digestion of the mass of different substances partaken of, inflammatory irritation of the digestive mucous surface, disorder of the biliary secretion and excretion, vascular plethora excessively or suddenly increased on each of such occasions, and the accumulation of excrementitious and irritating matters in the blood, are the common consequences of these indulgences. In many cases, not merely acid, but acrid or acro-rancid, combinations are formed by the imperfectly digested substances and the disordered secretions poured into the alimentary canal; and these increase or perpetuate the irritation of the mucous surface, whilst they exert upon the organic nerves a noxious influence, which is more or less manifested throughout the digestive circle, as well as in the extreme parts of the frame.

36. Neglected or constipated bowels, and interruption of any of the excreting functions, will occasionally be followed by an attack, without any cause having occurred that could have acted in any other way than this. Cold seems to operate, partly by suppressing the excretions, and partly by depressing nervous power. Its effects in exciting a paroxysm, whether applied to the general surface or to the extremities, or to any part, are well known. Fatigue and external injury not infrequently produce an attack: and the injured part is usually its seat; especially in cases of sprains, contusions, or concussions. The passions of the mind, also, have no mean influence. All powerful mental emotions, whether exciting or depressing, will excite a paroxysm; but anger or vexation has this effect in a very remarkable manner. The ancients made Anger to be the midwife of Gout; and Cadogan considered vexation, in its wide signification, as one of his three great causes of the disease. The depressing passions, particularly fright, severe grief, anxiety, &c., may either occasion an attack, or cause its retrocession, or give rise to a misplaced affection, or to some one of the irregular states of the disease noticed above, particularly in persons who have been formerly affected. Besides these, mental and bodily labour, especially when they abridge the requisite duration of sleep; the sudden cessation of habitual evacuations and excretions, as of the catamenia, hæmorrhoids, the *sudor pedum*, &c.; cold, flatulent fruits or vegetables; and acidulous liquors or beverages, sudden changes of diet or regimen; and whatever disorders the digestive and excreting organs, or suddenly impresses the nervous system; may excite the gouty paroxysm, either when the predisposition has been fully formed, or when an attack has been experienced. It is from a combination of two, or several, or even of many causes, that the disease is occasioned, especially if it appear independently of any hereditary taint. In a few instances, this taint seems almost sufficient to produce it, without the aid of any manifest intemperance. This remark was made by Galen, and Holler and others have confirmed it. Cases sometimes, also, occur of persons entitled by both parents to be subject to the disease, who have escaped it, although they lived intemperately. Quarin states, that he knew two brothers, sons of gouty parents: one of them lived soberly and laboriously, yet was horribly affected with gout; the other exposed himself to its common causes, and altogether escaped it: but these are rare exceptions from the general course of events. — It appears that females frequently acquired gout in ancient times, inasmuch as Seneca (*Epist.* 95.) mentions the circumstance as a proof of the depravity and luxury of his age.

37. V. The Pathological Conditions, on which gout depends, may be inferred from what has been already advanced as to its causes and phenomena. — *a.* The older writers imputed it to a peculiar morbid humour existing in the blood. This *materies morbi* has been somewhat differently explained. — Galen considered that it may be phlegm, or a mixture of phlegm and bile, or even blood, or all these, or simply a crudity of the circulating fluids; and that the gouty concretions arise from the crude humours.— Psellus believed that it is a thick humour generated and collected by an atony of the nutritive faculty.—Alexander Trallianus contended, that the defluxion of humours occasioning gout is various, according to the local changes and symptoms existing in different cases — that they are bilious, phlegmatic, melancholic, or even sanguineous; and that these occasion pain by getting between the tendons and ligaments, and distending and irritating them. — Aëtius maintained the disease to arise from a redundancy of humours caused by weakness of the part affected. — Cælius Aurelianus assigned the remote cause of gout with great accuracy, and

explained its nature in a nearly similar manner to the preceding writers. — PAULUS ÆGINETA considered that a preternatural humour and a weakness of the parts combine in producing the disease; and that the remote causes, which he enumerates very correctly, generate indigestion and a cacochymy, whence proceed various morbid humours which are bilious, melancholic, or sanguineous; but, for the most part, pituitous and crude, owing to excess of food and want of exercise. He attributed tophi or chalk-stones to thickness and viscidity of the humours, and the chronic or protracted forms of the disease to the admixture of several of these humours.

38. The doctrine of the humours, and the manner they give rise to arthritic complaints, have been fully explained by MACROBIUS (*Saturnalia*, vii. 4.). Mr. ADAMS, in the learned notes to his translation of PAULUS ÆGINETA, remarks that the theory of the humours, notwithstanding its being at present in little repute, accords better with the phenomena of the disease, and is a more successful guide to practice, than any hypothesis recently advanced. A similar preference to it has been given by SPRENGEL. It should also be mentioned, that the ancients, particularly those just noticed, recognised the hereditary character of the disease, and peculiar diathesis of gouty persons. The opinions of the Arabian writers are not materially different from those just stated. The most interesting production on the disease that has appeared, was written by DEMETRIUS PEPAGOMENOS about the middle of the 13th century, and was published at Paris in 1558. He states the remote causes of gout to be long-continued indigestion, repletion with food, drinking too much wine, venereal excesses, indolence or unaccustomed exertion, and retention of the natural secretions; the venereal excesses, especially, weakening the tone of nervous parts. These causes give rise to imperfect digestion, and the accumulation of excrementitious superfluities requiring to be evacuated from the system. When these excrementitious matters are retained, morbid humours are produced, and collected in the affected joints. This very ingenious writer further remarks, that when crudities or morbid humours are formed in the system, those parts which are vigorous cast them off; but that those that are weak are unable to accomplish this; and hence collections of such humours take place in them.

39. *b.* Many of the writers of the 16th, 17th, and 18th centuries were induced, by the appearance of the urine, and the concretions formed in the joints, to account for the phenomena of the disease upon chemical principles. — PARACELSUS first, and HOFFMANN and others long afterwards, ascribed the local and constitutional affections to the presence of tartaric salts in the blood, — an opinion very generally adopted until the middle of the last century. More recently, FORBES, PARKINSON, WOLLASTON, HOME, BRANDE, and others have endeavoured to show that there is always a redundance of uric acid in gouty persons; and, as will be shown hereafter, there can be no doubt that the constituents of this acid exist in them in excess. But this species of change is merely one of the elements of the gouty condition. The connection of the disease with plethora was very justly insisted on by Dr. CULLEN; and Dr. PARRY conceived that the paroxysm had a salutary influence in reducing a plethora relatively great, in restoring the balance of the circulation, and in determining the blood from internal and vital parts to the extremities. Here, again, is a part adduced for the whole of the mischief. Dr. SUTTON supposed that the cause of disorder is seated in the alimentary canal; but he attempted nothing beyond this very indefinite explanation. BROUSSAIS is more precise, if he be not more correct, in stating gout to be one of the several morbid manifestations depending upon inflammatory action in the gastro-intestinal mucous surface. In this opinion he has been pretty closely followed by ARMSTRONG, MACKINTOSH, and several writers of his own country. Dr. BATEMAN, Sir C. SCUDAMORE, and Dr. BARLOW have ascribed the disease to vascular plethora. Dr. BARLOW, especially, insists upon its inflammatory and plethoric nature, but pushes his doctrine too far; whilst he overlooks the connection of plethora with other morbid conditions.

40. *c.* It is indispensable to a correct view of the subject, to comprise all the elements forming the constitutional and local affections to which the term gout has been applied. If we analyse the numerous phenomena preceding, constituting, and following the disease; if we connect these with the causes most essential to their production; and if we refer to those agents which increase or diminish the severity of the symptoms; we must necessarily arrive at the conclusion, that gout does not depend upon one morbid condition only, but upon several; that neither the superabundance of excrementitious matters in the blood, arising from imperfect or effete assimilation — from the ultimate results of animalisation; nor vascular plethora, absolute or relative; nor gastro-intestinal irritation; nor gastro-hepatic disorder; is individually sufficient to explain all the changes constituting the disease; although they may be sufficient when viewed in connection. But, even when thus considered — especially if we push the analysis sufficiently far — some antecedent and concomitant lesion must be inferred. If we view the several causes in the connection and succession in which they usually give rise to gout, we must necessarily conclude, that the organic nervous energy is impaired or exhausted by them; and that, as the organic class of nerves bestows its influence on the digestive, the secreting, and excreting functions, exhaustion of its powers will impair the functions of the organs which it supplies. The necessary consequences of such impairment will be imperfect digestion and assimilation, torpor of the liver and bowels, impeded and disordered secretion and excretion, redundancy of excrementitious matters in the circulation, and vascular plethora, arising from deficient excretion, and from a continued supply of nourishment aided by a stimulated appetite. These may be viewed as the elements of the gouty constitution or diathesis; and, when it is formed, the local action will be excited by either, or by several, of the causes mentioned above (§ 35, 36.). That most of these causes affect the organic nervous influence more or less directly, is shown by the impaired or otherwise disordered functions of the organs more especially endowed by this system. To functional disorder and morbid sensibility succeed the accumulation of effete and irritating matters in the blood, and excited

vascular action, either local or general, or both. These matters aggravate the morbid sensibility and irritation, particularly in situations most prone, by previous disorder or debility, to experience either or both.

41. It is, however, not easy to explain satisfactorily wherefore the morbid action should manifest itself in the extremities, and assume peculiar characters, otherwise than by referring both circumstances to the previous change produced in the system — to the antecedent diathesis, either original or acquired; and to the morbid condition of the nerves, and of the exhalations and secretions of parts most remote from the centres of nervous power and of circulation. Weakness of the remote nervous ramifications will necessarily influence the circulation and secretions of the parts which they supply; and when the blood abounds with excrementitious matters, the exhaled and secreted fluids will necessarily possess preternatural or morbid properties, which will affect the sensibility of the extreme nerves, and irritate the tissues in which they are deposited. There are various phenomena, especially the sudden transition of the affection — which is sometimes as quick as electricity — from one part to another, that cannot be explained otherwise than by referring them to the organic nervous system. If we consider the intimate connection that exists between this system and the rest of the economy, and particularly the influence which it exerts upon the vascular system, which it supplies throughout; and view both in their intimate relations with one another, and with the rest of the frame, — if we contemplate them as intimately interwoven together — as possessing numerous and diversified communications with all the viscera and compound structures, — we shall easily conceive, that the altered sensibility existing in one part of this nervous circle may readily be transferred to other and distant parts, with the varying state of nervous influence, and with the several causes which may suppress it in its existing seat, or derive it to other organs; that a change in the state of the organic nervous influence, when preternatural or intense, may very obviously affect the capillary circulation and vascular action; and that, both nerves and capillaries being thus affected, the exhalations and secretions of the part will be also changed, particularly when the fluids circulating to it are in excess, or abound with excrementitious matters; the alteration of the fluids, both circulating and secreted, exalting the morbid sensibility and vascular irritability, and perpetuating the suffering, until the cause is removed, or both conditions are exhausted.

42. If this view be correct, several disputed matters connected with the disease will be more readily explained. For when the predisposition or diathesis is formed, and the organic nervous influence is morbidly affected in one or several parts, and the vascular system is inordinately repleted, causes affecting either the one or the other will not infrequently transfer the morbid action from one seat to another. The local affection of gout being the external manifestation of a constitutional disease, the suppression of it in one part will often be followed by its appearance in another; and its spontaneous extension to a new situation will as frequently derive it from its former seat; — for as long as the constitution continues in fault, nervous power being impaired, the vascular system overloaded, and the blood abounding in excrementitious matters, some organ must experience more or less prominent disorder. This view of the nature of gout further enables us to account for the primary seizure of an internal part or viscus; for, in proportion to the deficiency of nervous power, or to the abundance or vitiation of the circulating fluids, or to the weakened or congested state of some viscus, will the disposition to a misplaced or lurking form of gout exist; the vital manifestations being incapable of developing the disorder in the extremities, owing either to their impairment, or to the extent of the derangements just mentioned, or to both circumstances conjoined.

43. VI. TREATMENT. — i. The *Opinions of the Ancients* as to the treatment of gout, are in many respects as deserving of notice as those of modern writers. Indeed, there is little difference between the views of some of the former on this subject, and those of the latter. As at the present day, so in ancient times, were cold applications to the part, and colchicum internally, advised by some and condemned by others; so also, as may be seen from the *Tragopodagra* ascribed to LUCIAN, were numerous nostrums lauded for the complaint, as well as a rational treatment pursued by the regular practitioners of physic; and so also, as at the present day, the habits and irregularities of the patient brought discredit on the science of the physician, and led to the too general adoption of the opinion of OVID, that —

> "Tollere nodosam nescit medicina podagram."

44. HIPPOCRATES recommended purgatives by the mouth and by injection, and cooling applications to the part. In the more chronic cases, he advised means similar to the moxa of the Japanese.—CELSUS also prescribed refrigerant applications to the affected part; but he likewise had recourse to warm fomentations conjoined with anodynes, and to depletions. — ARETÆUS seems to have trusted chiefly to hellebore, and to applications of wool moistened with various substances, as oil, oxycrate, &c. — GALEN commenced the treatment of gout by evacuating offending matters by bleeding and purging; he afterwards had recourse to discutient applications. — CÆLIUS AURELIANUS directed blood to be abstracted from the part by scarifications, and sponges squeezed out of hot water, or oil and water, or a decoction of fenugreek, to be afterwards applied. He also prescribed gentle emetics and aperient clysters. He disapproved of burning the parts, and of the indiscriminate use of narcotics; but advised warm bathing, spare diet, emollient ointments, and afterwards gentle exercise. He enjoined complete abstinence from the commencement of the attack; and at its decline he prescribed a medicine nearly the same as the Portland powder. — ORIBASIUS confided chiefly in bleeding and purging, especially in plethoric persons, and in the spring. AËTIUS evacuated redundant humours by these means; and afterwards endeavoured to strengthen the parts.

45. ALEXANDER TRALLIANUS adopted a treatment which he viewed as appropriate to his pathology of the disease. In cases proceeding from a bilious humour, as indicated by burning heat and

the absence of swelling, he prescribed chologogue purgatives, consisting chiefly of cathartics and bitters conjoined, and cooling anodyne applications to the affected parts, with spare diet. When occasioned by a phlegmatic humour, indicated by the absence of heat and redness, he considered calefacients to be beneficial, and refrigerants injurious; and recommended a combination of purgatives and attenuants, as hellebore, thyme, cumin, &c. After purging, he directed warm attenuants internally, and calefacient anodyne cataplasms to the external affection. When there was general fulness of blood, or determination to the affected joint, he advised bloodletting, and abstinence from wine and animal food, and discutients to the part. He has remarked, that some insist upon taking medicines to allay at once the violence of their pains, not choosing to submit to a methodical treatment; but that he does not approve of this practice. For this purpose, he adds, the *hermodactylus* is particularly trusted to; and he admits that it seldom fails to remove a paroxysm; but he also affirms that it occasions more frequent returns of it. The identity of hermodactylus and colchicum is highly probable, as maintained by Prosper Alpinus, Sir H. Halford, and others. Alexander has further stated, that some endeavour to correct the prejudicial effects of this medicine by adding to it cumin, mastic, or ginger, thinking that its action is narcotic; but this he affirms to be a mistake; for in that case it could not prove cathartic. He admits, however, that these things may correct its bad effects upon the stomach; and he therefore prescribes a combination of the hermodactylus with aniseed, pepper, and myrrh, or with aloes, scammony, elaterium, colocynth, &c. He preferred, however, the *coronopodium* (which Mr. Adams, in his learned commentaries on Paulus, believes to be the buckthorn plantain or *plantago coronopus*), as it procures evacuations and relief from pain, without injuring the stomach.

46. Paulus Ægineta advised a nearly similar method to that adopted by Alexander. He employed chologogue purgatives for the evacuation of bilious humours, when he inferred gout to arise from this cause; and numerous cooling and anodyne cataplasms to the affected part, with a refrigerant and diluent diet, avoiding repletion and the use of heating dishes or liquors, as well as mental emotions and venereal indulgences. In the sanguineous form of the disease, and in the first attacks, he enjoined bloodletting and purgatives; the latter consisting chiefly of a combination of colocynth, aloes, black hellebore, and scammony. Some, he has remarked, have recourse to purging with hermodactylus; but it is bad for the stomach, producing nausea and anorexia, although it removes the disease very speedily. In gout from a mixture of humours, he also had recourse to depletions in early attacks; but, after frequent seizures, he considered the loss of blood injurious. Besides these, he directed a variety of both internal and external means; many of which deserve adoption, and are similar to those hereafter to be noticed. With respect to *prophylaxis*, he advised a moderate use of wine, exercise, and frictions of the joints, morning and evening, with oil triturated with salt.

47. The opinions of the Arabian physicians differ not materially from those of the Greeks. — Serapion, Avicenna, and Rhases recommended evacuations and the hermodactylus. — Haly Abbas directed bloodletting in cases proceeding from sanguineous plethora; and used cooling applications to the joints. For the bilious defluxion, he prescribed emetics and drastic purgatives, consisting of scammony, aloes, colocynth, and hermodactylus; and for the serous or phlegmatic defluxion, very nearly the same means, the local applications being varied. The treatment adopted by Alsaharavius was almost identical with that pursued by Alexander, Paulus, and Haly Abbas.

48. Demetrius Pepagomenos has justly remarked that the *prophylaxis* of gout is easily prescribed, but followed with great difficulty. It consists in great moderation in eating and drinking, and in avoiding indigestion. Viewing the disease as one of repletion, he ordered evacuations for its cure, consisting of emetics, bloodletting, and purgatives, and with a very judicious reference to the form and stage of the disease. He forbade the use of strong emetics; but vomiting by gentle means he had recourse to at the commencement. In early attacks, and at their beginning, when there was evidence of plethora, he prescribed bloodletting; but he considered it prejudicial in other circumstances, or much inferior to active purging. He was favourable to the use of hermodactylus as a purgative, and combined it with aromatics. In other respects his treatment was similar to that of Alexander.

49. The reader will observe, from what has been just stated, how little has been added to our knowledge of this subject by the numerous productions that have appeared since the revival of learning in Europe; and that, although there is much that is trifling, a little that is absurd, and something that is questionable, in the doctrines and treatment of gout adopted by the ancients, there is also much deserving of commendation and adoption.

50. ii. *Treatment of Acute Gout.* — The *indications* are — 1st. To avert a threatened attack; — 2d. To alleviate the symptoms during the paroxysm; — and, 3d. To prevent the return of the disease, by suitable regimen and medical treatment, after the paroxysm has ceased. — *A.* In order to avert, or to render more mild, a threatened attack, the *premonitory symptoms* should be treated promptly and judiciously. Much suffering and injury to the constitution have arisen from the idea that the paroxysm is a salutary effort of nature, and that the prevention of it may be followed by serious consequences. There is, however, some truth in the opinion; for, as I have shown, the external affection being the outward manifestation of constitutional disease, the suppression or prevention of it in an external part may lead to results still more severe than the impending attack. But it is the suppression of the paroxysm by means which leave the constitutional disorders untouched, or which increase them, that is injurious, and not the prevention of it by remedies directed to the removal of these internal disorders themselves, in which the attack originates. A large dose of an acro-narcotic, as of colchicum, veratrum or veratria, aconitum, &c., has often the effect of suppressing the morbid sensibility, and with it the irritative vascular action of the seizure; and thus frees the patient

from the impending suffering for a time. But it leaves the internal disorders, of which the external is merely a part, in the same state as before, or even increases them; inasmuch as it tends to weaken organic nervous power, to irritate the digestive mucous surface, and to impair the functions of excretion; and the consequence is, either a more frequent return of the precursory symptoms of the attack, or the supervention of some serious visceral disease. The means, therefore, to be had recourse to, in order to avert the paroxysm, should be those only which are calculated to remove the internal derangements, in which it originates. These derangements we have seen to be — weakened organic nervous power; a torpid state of the functions of the liver, with accumulations of bile in the biliary passages and liver; congestion of this viscus; fæcal accumulations in the large bowels; collections of mucous sordes on the digestive mucous surface; vascular erethism, or inflammatory irritation of this surface; and the superabundance of excrementitious matters in the circulation. Means, therefore, which will remove these conditions, and prevent their recurrence, will the most effectually avert both a threatened paroxysm, and a return of the disease.

51. Guided by those views, general *bloodletting* may be employed in robust and plethoric persons. If signs of congestion of the head or of the liver be present, or of inflammatory irritation of the digestive mucous surface, local depletions may be substituted, or used in addition to the general evacuation. The quantity of blood taken away should depend upon the age and strength of the patient, and other circumstances of the case. Hæmorrhoidal or other spontaneous evacuations ought to be encouraged by aloetic purgatives, &c. If the tongue be much loaded, and if heartburn, acrid eructations, or nausea be complained of, neither pain nor tenderness of the epigastrium being present, an *emetic* will generally be of service. But if vascular depletion be indicated, it should be premised. Emetics have been recommended by Celsus, Fabricius Hildanus, Gesner, Stoll, Scudamore, and others: they will be found most serviceable as here advised; in other circumstances, they are doubtful means, and require much discrimination. If indigestible matters remain in the stomach, emetics should not be withheld; but when there are pain and tenderness at the epigastrium, with determination to the head, they may be injurious. — In almost every case *purgatives* should be prescribed, although the bowels may have been said to be regular or open; for collections of morbid secretions in the biliary organs, and of fæcal matters in the cells of the colon, may nevertheless exist. Therefore, a full dose of *calomel*, with *camphor* or with *James's powder*, or with both, may be given at bed-time, and a stomachic purgative the following morning. The draught here prescribed, I have found most efficient, especially when the bowels are very sluggish; and the frequent repetition of it is attended by no disadvantage: —

No. 233. ℞ Infus. Gentianæ Comp., Infus. Sennæ Comp., āā ℥j.; Magnes. Sulphatis ʒjss. (vel Sodæ Subcarbon. ℈j.); Tinct. Cardamom. Co. et Tinct. Sennæ āā ʒjss. M. Fiat Haustus, quamprimum mane sumendus.

52. If the excretions continue to present, or assume morbid appearances, a small dose of blue pill, or of hydrargyrum cum creta with soap, or a full dose of calcined magnesia, should be taken at bed-time, and the above draught in the morning, until they assume a natural character. If the precursory symptoms continue nevertheless, I agree with Sir C. Scudamore in considering that the constitution is labouring under the causes of the paroxysm, almost as much as if the attack had been developed, and that the treatment required during the paroxysm should be resorted to. If the means here recommended restore the functions to a healthy state, abstinence or moderation in diet, regular exercise, especially on horseback, mental quietude, and early hours, should be strictly observed.

53. *B.* The *Treatment of the Paroxysm* should be varied according to the age, strength, and habit of body of the patient, to the predisposing and exciting causes, to the duration and characters of the paroxysm, and to the frequency and severity of the previous seizures. — *a. Bloodletting* is required in the plethoric and robust, and in early attacks, when the constitution is unbroken, and the inflammatory diathesis evidently exists. In these circumstances it has been advised by Celsus, Galen, Alexander, Horstius, Riverius, Jumelin, Le Tellier, Sydenham, Patten, Huxham, Cullen, Hosack, Musgrave, Macbride, De Vernevil, Heberden, Scudamore, &c. It has been too strongly insisted upon by Hamilton, Rush, and Barlow; whilst it has been considered injurious by Trampel, Barthez, Hallé, and Guilbert, unless when the inflammatory action is very manifestly developed in some internal organ; or in strong plethoric persons, when the general vascular excitement is very great.—The practitioner should be guided as to the extent of the depletion, by the circumstances above alluded to; keeping in view the fact, that the disease is one more of irritation than of inflammation; that the vascular excitement is in great measure the consequence of the morbid sensibility, and will subside as it is subdued. *Local depletions* are often preferable to general bloodletting, particularly when tenderness, or fulness of the epigastrium or hypochondria, is present, and will generally be sufficient to remove hepatic congestion, and vascular excitement of the gastro-enteric mucous surface. When bloodletting is clearly indicated, it should not be delayed; as the benefit it is calculated to afford will be diminished very materially by delay; the debility consequent upon unmitigated irritation, rendering the deferred depletion of little or no avail.

54. *b. Alvine evacuations* are of less doubtful efficacy even than vascular depletion.—*Emetics* are sometimes of service at the commencement of the paroxysm, when the symptoms indicating (§ 51.) the propriety of resorting to them are present. In some cases they mitigate the attack; whilst in others they have little or no effect upon it. They ought to be employed with caution. When the case requires both vascular depletions and an emetic, the latter ought not to be exhibited until the former has been carried into effect. —*Purgatives* are of the most unequivocal benefit. Many of the empirical remedies employed against the disease are serviceable only in as far as they increase the alvine excretions. As vascular congestion of the liver, and accumulations of bile in the biliary passages, are often connected with the production of the fit, such purgatives as promote

the circulation in this organ, and increase its excreting function, should be selected. With this view, from five to ten grains of calomel, with four or five of James's powder, may be given at bed-time, and the draught prescribed above (§ 51.) early on the following morning. If these do not act in the course of a few hours, a dose of magnesia, and of sulphate of magnesia in any aromatic water, may be taken, and repeated until the bowels are freely opened. Purgatives were actively employed in gout by the ancients, *veratrum* and *hermodactylus* having been chiefly used with this intention. Rhazes advised a cathartic to be repeated eight times. Riverius, Riedlin, Thilenius, Cadogan, and most English writers, have recommended them. Schrœder preferred the preparations of rhubarb; and these, conjoined with magnesia, or any of the other purgatives in common use, may be prescribed. Sir C. Scudamore prescribes the *colchicum* in the first aperient draught, giving from one to two drachms of the acetic preparation, neutralised by magnesia, and conjoined with the sulphate of magnesia. This medicine he repeats at intervals of four, six, or eight hours, according to its action, and the urgency of the symptoms. Although this is amongst the mildest of the preparations of colchicum, especially when its acetic acid is neutralised by magnesia, yet I have seen it, in this dose, productive of serious effects; and it is more likely to be injurious when it fails in acting upon the bowels; for in this case its influence is exerted upon the nervous system, and not upon the excreting functions — the morbid sensibility being partially suppressed by it, but the source of disorder remaining untouched. The consequences are, either a frequent return of the fits, or a continuance of the internal affections in aggravated forms, or the supervention of some one of the irregular states of the disease. Where biliary accumulation or congestion of the liver exists, a large dose of colchicum, unless conjoined with an active stomachic purgative, may, in the early stage of the paroxysm, so suddenly suppress it, as to give rise to the serious affections alluded to under the head of retrocedent and misplaced gout (§ 18. 21.).—This is no suppositious case, for two such instances have fallen within my own observation, one of which has been already adverted to (§ 19.).

55. In early fits of the disease, when much inflammatory excitement exists, *colchicum* may be conjoined with the cooling saline purgatives, and with magnesia, as Sir C. Scudamore advises; but the dose should be much less than just mentioned, and ought seldom to exceed half a drachm of any of the fluid preparations; and it should not be given more frequently than thrice in the day, until the effects are observed; as even in this quantity, I have seen it have, in some constitutions, a very remarkably sedative influence, producing even serious symptoms. In several persons, and three of these members of the profession, I have observed that even twenty drops of the mildest preparations of colchicum could not be taken without most distressing internal irritation, and a sense of sinking being produced. This effect still more frequently occurs in the atonic or chronic states of the disease. Therefore, when the patient is either advanced in life, or has suffered repeated attacks, or is possessed of weak constitutional power, the combination of colchicum with antacids, and warm stomachics, or the spiritus colchici ammoniatus, will be most appropriate; and either the infusion of senna, or of rhubarb, or the decoction of aloes, may be added to them, in such quantity as may be required to operate freely on the bowels.

No. 234. ℞ Infus. Caryophilor., Infus. Sennæ Comp., āā ʒ vj.; Magnes. Calcinatæ ℈ j.; Tinct. Rad. Colchici, ♏ xxv. (vel Aceti Colchici ʒ ss.); Spiritus Pimentæ, ʒ ss. M. Fiat Haustus, ter in die sumendus.

No. 235. Infusi Aurantior. Comp., Infus. Rhei, āā ʒ vj.; Magnes. Carbon. ℈ j.; Vini Seminis Colchici ʒ ss. (vel Spirit. Colchici Ammon. ♏ xxxv.); Tinct. Cardamom. Comp. ʒ j. M. Fiat Haustus, sextâ quâque horâ sumendus.

No. 236. Decocti Aloës Comp. ʒ vij.; Aquæ Menth. Virid. ʒ ivss.; Tinct. Seminis Colchici ʒ ss.; Spirit. Ammoniæ Arom. ʒ j. M. Fiat Haustus.

No. 237. Sodæ Sub-carbon. ʒ ss.; Vini Colchici (vel Spirit. Colchici Ammon.) ʒ ss.; Infusi Sennæ Comp., Infusi Aurant. Comp., āā ʒ vj.; Spirit. Lavand. Comp. ʒ j. M. Fiat Haustus.

56. It will often be necessary, especially when the countenance is sallow or bilious, the hypochondria and epigastrium full, or tender on pressure, to exhibit on alternate nights, or even every night, a dose of calomel, or of blue pill, with James's powder. But care should be taken that the mercury does not produce its specific action, which very generally will be prevented by the active exhibition of the purgatives just mentioned. Where much febrile excitement exists, James's powder, or some other antimonial, with or without an anodyne, according to circumstances, should be prescribed; and if nervous power be much reduced, two or three grains of camphor may be either substituted for these, or conjoined with them. The colchicum may be given in the form of pill, the powder being combined with camphor and the watery extract of aloes, or the aloes and myrrh pill, three or four doses being taken in the 24 hours, and as much of the purgative as will operate sufficiently on the bowels. The action of colchicum is exerted chiefly on the digestive mucous surface and liver, the secreting functions of which it manifestly augments. When it does not pass quickly off by the bowels, it is partially absorbed, and increases the functions of the kidneys. It was employed by the ancients, and physicians of the middle ages, and entered into the composition of most of the gout specifics of every epoch. Stoerck introduced it into regular practice in modern times, and used it chiefly as a diuretic. Mr. Want brought it into use in 1815 as a cure for gout. Since then it has been very generally, and but too often injudiciously, employed in this and in other diseases.

57. Cathartics are not equally suited to all cases. Where the bowels are very torpid, the liver congested, and the tongue loaded, they (see *Appendix*, F. 181. 266. 378. 430.) are necessary, and it is chiefly by them that we can remove the excrementitious matters abounding in the circulation. But in other instances, particularly when these disorders do not exist, or when the bowels are easily relaxed, or are irritable, and when the patient is nervous and debilitated, aperients or laxatives, and saline medicines with the alkali in excess, or calcined magnesia with or without colchicum, will be more serviceable than active purgatives, unless conjoined with tonics, aromatics, or stimulants.—Neutral salts, taken so as to act gently upon the bowels, have generally also a refrigerant effect; and being partially absorbed,

exert a beneficial influence on the circulation and functions of the kidneys. When the saline medicine is conjoined with an alkali or with magnesia, these effects are still more manifest, and not only are the intestinal discharges increased, but the urine is rendered more copious and natural. Colchicum judiciously combined with these will often allay pain, bring down the pulse, and promote the secretions from the liver and kidneys; but if it occasion depression or nausea, it should be discontinued. Although purgatives are unequivocally beneficial when employed as here advised, yet SYDENHAM, WARNER, and most French writers have condemned the use of them in this disease. Even HEBERDEN does not appear favourable to them. This, however, evidently arises from either an injudicious use of them, or inappropriate modes of exhibiting them.

57. *c. Diuretics* are beneficial in this disease, in as far as they promote the removal of excrementitious matters from the circulation. The saline substances already alluded to, and the alkalies, are, upon the whole, the most preferable of this class of medicines. Of the former, the citrates of potash and of soda, the acetate of potash, and the sulphates of soda and magnesia, are to be preferred; and of the latter, the fixed alkalies, and magnesia. M. MAZUYER recommends potash and its acetate, from an opinion that the presence of uric acid in the blood is a principal cause of the disease. Alkalies in various forms have been long recommended in gout. In the form of soap, they have been prescribed by BOERHAAVE and WHYTT. Their subcarbonates were used by TOZZI, QUARIN, BLANE, GARDNER, WOLLASTON, and others. The alkaline earths have, however, been preferred by several writers, especially when acidity of the *prima via* existed. WHYTT and BLANE were favourable to lime-water, and preparations of chalk, in these circumstances. Magnesia, both calcined and carbonated, has been generally employed, and is preferable, upon the whole, to any other absorbent, inasmuch as it acts gently upon the bowels and kidneys, without weakening the digestive mucous surface. Its effects in removing the morbid state of the urine in gouty subjects, which has been so well described by Dr. PROUT, and noticed above (§6.14.), are very remarkable. The liquor potassæ, or BRANDISH's alkaline solution, exhibited in a bitter infusion, with the extract of taraxacum, or in the decoction of taraxacum, will also be found useful, especially when chronic disorder of the liver is present; small doses of blue pill, or of PLUMMER's pill, with soap, being given at bedtime, and the emplastrum ammoniaci or the emplastrum picis compositum conjoined with it, being placed on the epigastrium, and right hypochondrium. The preparations of squills, or the spiritus ætheris nitrici, may be given with the saline and alkaline substances just noticed, when the urinary secretion is scanty.

58. *d. Diaphoretics* during the paroxysm have been recommended by some writers, and disapproved of by others. There can be no doubt of perspiration being a favourable evacuation in this, as in many other diseases, inasmuch as excrementitious matters are thereby removed from the system. QUARIN remarks, that those who sweat much, or void much urine, are rarely afflicted with gout; and the reason is obvious. Sir C. SCUDAMORE states, that sudorifics should be given with some caution, as they tend to debilitate the stomach; and this is doubtless the case with respect to the common preparations of antimony, although RHODIUS, RIVERIUS, VICAT, BRANDIS, and HUFELAND prescribed them when inflammatory fever accompanies the paroxysm: and in this state they are beneficial, especially when conjoined with gentle refrigerants and narcotics. DOVER strongly recommended his celebrated powder in this case; but he employed nitre, instead of the sulphate of potash of the more modern preparation. *Camphor*, however, in doses and combinations appropriate to the circumstances of the case, is a most unexceptionable medicine, inasmuch as it has an anodyne effect, whilst it promotes the exhalations and secretions. It may be conjoined with James's powder, or with mercurials, or with anodynes, or with all of them, according to existing pathological states. It has been almost entirely overlooked by recent writers on the disease, although it was recommended by LENTIN, CHRESTIEN, COLLIN, BANG, and OSIANDER. I have prescribed it frequently, especially in the more chronic and irregular forms of gout; and found it, particularly in conjunction with opium, or the acetate or muriate of morphia, a most valuable remedy. The decoction of *guaiacum* was much employed by SABAROT, TODE, WEISMANTEL, GRUNER, SMETIUS, THEDEN, AASKOW, ACKERMANN, DUNCAN, and BALDINGER; but it is more suitable to the atonic or chronic states of the disease than to the acute. It is, however, sometimes useful, conjoined with alkalies and anodynes, after the bowels have been freely evacuated, in old cases and in debilitated habits. It is most beneficially exhibited in the form of compound decoction, as prescribed in the Edinburgh and Dublin Pharmacopœias; or in that of the ammoniated tincture, when debility is considerable.

59. *Warm baths* and *vapour baths*, simple and medicated, have been long recommended as diaphoretics, for the removal of gout in its various forms. ACTUARIUS, ZACUTUS LUSITANUS, LENTIN, GIRAULT, QUARIN, BRANDIS, ALBERS, SCHACHER, RULAND, PALLAS, WAIZ, MOLWIZ, OLIVER, and INGRAM prescribed them. Sulphuretted baths, warm salt-water baths, and aromatic warm or vapour baths, have been favourably noticed by THILENIUS, QUARIN, ALBERS, and HUFELAND. The simple vapour bath was much praised by MARCARD and BLEGBOROUGH; and warm baths prepared from a decoction of emollient herbs, by PELARGUS and others. The *camphorated vapour bath* promises to be more serviceable than any of these, although they are severally of advantage when appropriately used.

60. If the patient be young and robust, or suffering a first or early attack, or if the constitution be not materially impaired, and especially if vascular excitement and pain be very great, the several means already noticed may be so prescribed as to produce decided antiphlogistic and refrigerant effects. The *antiphlogistic treatment*, to the fullest extent, has been advised by LANGIUS, WERLHOF, HUFELAND, BARLOW, and others; and in the circumstances just specified, or even in others more equivocal, it is more or less beneficial. — *Refrigerants*, as nitre, muriate of ammonia, &c., have been given internally by

Marcus, and others; and, in the above circumstances, they may be serviceable; but in persons of weakly habits, and in the more protracted cases, their effects should be carefully watched. In most instances, the saline aperients and diuretics prescribed above prove sufficiently refrigerant; and the more cooling diaphoretics, particularly camphor julep, the solution of the acetate of ammonia, and spirits of nitric ether, have a similar effect.

61. *e. Narcotics* have been long employed during the height of the paroxysm, both internally and to the affected part. Aëtius, Zacutus Lusitanus, Mayerne, De Launay, and many others have recommended them. — *Opium*, either in its crude state, or in the form of Dover's powder, or of Sydenham's laudanum, has been preferred by De Heide, Doemling, Nunn, Warner, Matthæi, Kinglake, Marcus, Sutton, Guilbert, &c. Several writers have, however, chosen either the black drop, or Battley's solution, whilst contemporary practitioners have recourse more frequently to the acetate or muriate of morphia. More advantage, however, will accrue from the judicious combination of the opium with other remedies, than from a selection of either of these preparations. Opiates ought never to be prescribed until fæcal accumulations and morbid secretions have been evacuated. If prescribed earlier, or otherwise improperly used, they are liable to the same objections as have been urged against colchicum — one of the effects of which, it should be recollected, is anodyne. Dr. Cullen remarks, that although they mitigate the severity of the fit, they occasion its return with greater violence; but this objection holds equally strong in respect of all narcotic and anodyne substances employed without sufficient regard to the removal of those morbid conditions of the internal viscera upon which the disease chiefly depends. It is, therefore, indispensable to a successful treatment, to evacuate morbid matters previously to the use of these medicines; and to promote the action of excreting organs, whilst we employ them. In weakly habits, or where there seems to be a state of asthenic or irritative action in the fit, and particularly if the external affection shifts its seat, the opiate should be conjoined with camphor, in doses proportioned to the urgency of the nervous symptoms, or of vital depression. This combination will promote the cutaneous excretion; the camphor preventing any tendency to the retrocession or suppression of the paroxysm that may exist, or that the opium may occasion. Hamilton, Plenciz, and some other writers have advised calomel to be conjoined with the opium. When chronic disease of the liver is present, the practice is judicious; but purgatives should also be prescribed, and the effects carefully watched. The mercurial ought to be withdrawn when relief is obtained, or as soon as it evinces its specific action. Where there is much febrile excitement, the opiate will be usefully conjoined with James's powder, or other antimonials, or with ipecacuanha and refrigerants. The acetate or muriate of morphia should be preferred when opium occasions headach, gastric disorder, or other unpleasant effects; and either may be given with aromatics, camphor, &c., according to the peculiarities of the case. A large dose of the extract of *white poppy* may be directed in similar circumstances.

62. *Aconitum* has been recommended chiefly by Continental physicians, and is certainly a medicine of greater efficacy than is generally supposed in this country. It has been favourably noticed by Stoeller, Boehmer, Reinhold, Stoerck, Quarin, Stoll, Vogel, Collin, Murray, Thickness, Warburg, Zadig, Barthez, and Brera; but it is more appropriate to old or chronic cases, or to weak habits of body, than to recent attacks attended with general vascular excitement. The powdered leaves, or the extract, may be used. Besides its narcotic effect, it produces a very decided action on the skin. *Belladonna* has likewise been prescribed by Ziegler, Boetscher, and Mönch; *Conium*, by Percival, Solenander, Coste and Thickness; the *Humulus Lupulus*, by Freake; and the *Lactucarium*, by Duncan and Scudamore. *Hyoscyamus* is, however, preferable to either of these, when it is desirable to avoid constipation of the bowels. I have, however, seen the belladonna very serviceable in two or three instances; and in these it produced its specific eruption on the skin.

63. *C. Local Treatment in the Paroxysm.* — *a. Leeches* have been applied to the inflamed part by Werlofh, De Haen, Boyer, and Mackintosh; and even *scarifications* have been advised by Salmuth, Thilenius, Riedlin, Hoffmann, Bauer, Reusner, and Watts. Sir C. Scudamore remarks, that he has seen, in a few cases, the application of leeches followed by the sudden transition of the inflammation to the other limb, indicating that the constitutional causes were not relieved by the local loss of blood; and that he has generally found the debility of parts and œdema both greater and more lasting after this practice. In three instances, where he directed blood to be taken from the distended veins near the foot, an increase, rather than diminution, of pain was the consequence in two, and much local weakness in the third of them. — *Blisters* applied to the affected part have been recommended by Bouvart, Riedlin, and Stevenson. Trempel considers them injurious; and Dr. Cullen admits the occasional efficacy both of them and of urtication, but considers them hazardous. They are sometimes, however, useful in the more chronic or asthenic states of the disease. — *Moxa*, as a local application to gouty joints, has been resorted to in Eastern countries from time immemorial, and appears to have been known to Hippocrates and subsequent ancient writers. Amongst the moderns, Bose, Ten Rhyne, Thilenius, Pechlin, Theveno, Acerbi, Pallas, Kaempfer, Valentini, and Ingram have noticed it. Sir W. Temple (*Works*, vol. iii.) derived benefit from it in his own case.

64. *b. Fomentations and poultices*, both simple and medicated, have been long advised for gout. Hornung and Riedlin have directed fomentations with an infusion of tobacco, and Kunrath poultices with the leaves of hyoscyamus; but, although they may relieve the pain, they relax and weaken the parts. Alexander Trallianus has stated, that they occasion a chronic state of disease, and favour the formation of concretions. Poppy fomentation, the vapour of hot water impregnated with aromatic herbs, and various emollient herbs and flowers used in the form of poultice, have been recommended. Grüling has advised the application of the infused flowers

of the sambucus; but it is very doubtful whether any of these is truly beneficial. Sir C. SCUDAMORE, however, remarks, that a poultice made with bread, scalded with boiling water, pressed through a strainer to dryness, and then rendered sufficiently soft by the addition of one part of alcohol, and three of camphor mixture, is frequently of service when applied just tepid directly to the affected part, and kept on during the night only. This writer states, that he has employed, with the best success, a lotion composed of one part of alcohol and three of camphor mixture, rendered agreeably lukewarm by the addition of a sufficient quantity of boiling water, and applied by means of linen rags. He remarks, that if the temperature be higher, it is less beneficial; and if it be lower, it is liable to the objections urged against cold applications. — *Warm pediluvia* have been resorted to, but are injurious whilst the inflammation remains. Sir C. SCUDAMORE has seen the symptoms reproduced by their employment at the decline of the paroxysm, and has adduced instances where they caused a metastasis of the local affection. Combed *wool*, and various other applications, made with a view to accumulate the warmth, and promote the perspiration of the part, have been very much resorted to; and I have seen much relief obtained from soft flannel wrung out of warm water, wrapped about the part, and closely covered by oil-skin; but this practice is open to the objections already noticed.

65. *c. Local refrigerants* have received the sanction of HIPPOCRATES, CELSUS, CAMERARIUS, ZACUTUS LUSITANUS, KOLHAAS, KECK, VANDER HEYDEN, BARTHOLIN, PECHLIN, BERGIUS, LAUZANI, PIETSCH, and KINGLAKE. Dr. HEBERDEN states, that the celebrated HARVEY applied cold in his own case. Dr. GOOD followed his example in his early attacks, and whilst the vigour of his constitution was not materially impaired; afterwards, when the disease appeared with more debility and irritability of the system, he judiciously refrained from this practice. In strong persons, the application of cold will afford relief, and it may not be injurious; but in other circumstances, it is hazardous. MARCARD, and numerous writers since his time, have shown its bad effects; for, like all other means tending to relieve the local affection, whilst the constitutional disorder remains untouched, it may cause the transition of the disease to some other situation, either external or internal. — The application of *veratria* or of *aconitine* to the part, in the form of ointment, (Veratriæ gr. x—xv.; Adipis præpar. ʒiv.), has been recommended by Dr. TURNBULL, but it is liable to the objection just urged. — The leaves of the *Cactus Opuntia* have been used as a poultice, by PAULE and PAPEN; and relief has been derived from the common cabbage leaf. I have seen a steak of raw beef, applied either whilst still warm, or immediately after it was cut from the recently killed animal, produce remarkable relief, and without any consequent inconvenience. It is deserving of further trial. These two latter are popular remedies in some countries.* — External applications of an active kind are generally either of little benefit, or are hazardous, in the nervous or debilitated; in persons liable to painful affections of the stomach and bowels; in those subject to palpitations or irregular action of the heart, or to disorders referrible to the encephalon; and in those complaining of diseases of the lungs, or of asthmatic attacks.—The tepid lotion and poultice advised by Sir C. SCUDAMORE, and liniments of oil of almonds and camphor liniment, or tepid epithems, are, upon the whole, the safest and best.

66. *D. The Diet and Regimen during the paroxysm* should be strictly regulated.—In this form of gout, especially, the diet should be spare, cooling, and chiefly farinaceous. Boiled bread and milk are praised by Sir C. SCUDAMORE; but it sometimes produces acidity; which, however, may be prevented or corrected by the admixture of a small quantity of calcined magnesia. Arrow-root, sago, or panada slightly spiced, will generally be sufficient as long as febrile excitement continues; but in nervous, debilitated, or irritable habits, a little Madeira or sherry, or a dessert spoonful of brandy, may be added to these. As the paroxysm subsides in these constitutions, a little light animal food, and an additional allowance of wine, may be permitted, particularly if the patient's previous habits require the indulgence. The best beverage during the fit is tepid whey, which may be taken in any quantity: it aids the operation of the medicines on the bowels and kidneys. A weak infusion of sassafras, weak black tea, thin gruel, barley water, or other diluents, may be also used; but acid drinks should be avoided. Small quantities of the subcarbonate of potash may be added to these, and they may be rendered more agreeable by a few slices of orange or lemon peel. Grapes and ripe oranges may be likewise allowed, if they be not found to occasion flatulency or acidity. A very restricted diet in the fit has been strongly insisted upon by CELSUS, THRIVERIUS, RIEDLIN, PIETSCH, and CADOGAN, who have justly considered it an important part of the treatment; for, if nourishment be too liberally allowed, or if it be stimulating, from a mistaken notion of supporting the strength, the result will be merely the aggravation of the disease. The patient should not remain in bed for a longer period than is really necessary, but begin to use his limbs gently as soon as possible. SYDENHAM recommends that he should take exercise in a carriage even in the beginning of a fit; but this is seldom beneficial, and therefore unnecessary. An attack has been

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* The following list of substances, although adduced satirically in the Τραγοποδαγρα of LUCIAN, was actually employed by the ancients in the external treatment of gout: —

"Terunt plantagines, et apia . . . . .
Et folia lactucarum et sylvestrem portulacam.
Alii marrubium; alii potamogeïtonem;
Alii urticas terunt; alii symphytum;
Alii lentes adferunt ex palustribus lectas;
Alii pastinacam coctam; alii folia persicorum,
Hyoscyamum, papaver, cepas agrestes, mali punici cortices,
Psyllium, thus, radicem ellebori, nitrum,
Fœnum græcum cum vino, gyrinum, collamphacum,
Cyparissinam gallam, pollen hordeaceum,
Brassicæ decoctæ folia, gypsum ex garo,
Stercora montanæ capræ, humanum oletum,
Farinas fabarum, florem asii lapidis:
Coquunt rubetas, mares-araneos, lacertas, feles,
Ranas, hyænas, tragelaphos, vulpeculas.
Quale metallum non exploratum est mortalibus?
Quis non succus? Qualis non arborum lacryma?
Animalium quorumvis ossa, nervi, pelles,
Adeps, sanguis, medulla, stercus, lac.
Bibunt alii numero quaterno pharmacum:
Alii octono; sed septeno plures.
Alius vero bibens hieram purgatur:
Alius incantamentis impostorum deluditur," &c.

prevented by determined exertion, or by a long walk; but it has also been brought on by the same cause. Dr. SMALL advises the patient to walk abroad as soon as the inflammatory action has ceased, and argues that gouty persons owe their lameness more to indolence and fear of pain than to the disease. Sir C. SCUDAMORE, however, states, that he has seen the too early exertion of the limb produce a relapse. When the pressure of the bed-clothes cannot be borne, the part may be protected by a cradle.

67. *E. Treatment during Convalescence and in the Interval.* — Treatment ought not to be relinquished with the subsidence of the paroxysm, but directed to the restoration of the healthy state of the digestive and excreting functions, and of the strength of the weakened limbs. If these ends be not attained, the patient will be liable either to protracted convalescence, or to the speedy return of the fit. During recovery, the appetite is often in a state of morbid excess, whilst the powers of digestion and assimilation are weakened. This seems to be owing to the vascular erethism of the gastric mucous surface, and requires the restraint of the physician, and the self-control of the patient. The meals should be light, and in moderate quantity. Where there is much debility, half a pint of asses' milk may be taken early in the morning, and repeated at night. Animal food ought to be sparingly indulged in; and soups, pie-crusts, pickles, and pastry of all kinds, avoided, as they generally occasion, in gouty persons, acidity of the prima via. The stomach should not be required to perform more than its strength will admit of, nor goaded to exertion by stimulating or heating beverages. Where there is a tendency to plethora or vascular excitement of the digestive mucous surface, or to congestion of the liver, or to determination to the head, this caution ought to be carefully observed. It will, however, be necessary to restore the organic functions by an appropriate use of bitters or other tonics; but these medicines should either be postponed until the secretions and excretions are restored to a healthy state, or be conjoined or alternated with means directed to fulfil this intention. Whilst the tongue continues loaded, mild purgatives or deobstruent aperients are necessary; but purgatives alone will frequently fail of removing this symptom, and restoring the healthy functions of the abdominal viscera, unless tonics are also exhibited. The state of the tongue, in these cases, frequently depends more upon the constitutional disorder and debility, than upon the state of the alimentary canal. It will, therefore, be preferable to conjoin tonic infusions with such a quantity of the infusion of senna or of rhubarb, as will act moderately on the bowels; and to these, either of the alkaline carbonates and the extract of taraxacum may be added. Craving of the appetite is to be referred to debility, or to the cause already adduced; and will generally be removed by tonics, judiciously combined with alteratives and laxatives.

68. In a large proportion of cases, the treatment during convalescence, and in the interval, should consist chiefly of a restricted diet, abstinence from wine and heating liquors, and a careful regulation of the quantity of food to the degree of physical exertion used by the patient. In tolerably sound constitutions, tonics will merely increase vascular plethora — especially if chalybeates be employed, — unless active exercise be taken, and secretion and excretion be promoted. When there is chronic disease of the liver, or torpor of this organ, or biliary obstruction, mercurial alteratives should be given at bed-time, and an aperient draught with taraxacum early in the morning. The emplastrum ammoniaci cum hydrargyro may also be applied to the right hypochondrium and epigastrium. In nervous, irritable, or debilitated persons, the judicious use of tonics is beneficial. In many cases, the compound decoction of sarsaparilla, the mezereon being omitted, will prove gently tonic as well as alterative; but, when the debility is greater, the sulphate of quinine, or the preparations of bark, are preferable. The infusion or decoction of cinchona, or any of the other tonic infusions, may be prescribed with the alkaline carbonates, and the aromatic spirit of ammonia, and, when the stomach is irritable, with an increased quantity of the carbonates, and taken during effervescence with fresh lemon juice. When the bowels are sluggish, a compound infusion of tonics and aperients may be given in the manner I have just advised; or any of the medicines directed above (§ 50. 56.) may be used; or the compound decoction of aloes may be taken with the compound infusion of gentian, or with the infusion of cascarilla, or with camphor julep, as recommended by Sir C. SCUDAMORE; an alterative pill, consisting of PLUMMER's pill and soap, or of hydrarg. cum creta, the compound rhubarb pill and soap, being taken at night. — When there is no tendency to inflammatory action or congestion of the liver, debility of the digestive organs, as well as a sluggish state of the bowels, will be remedied by quinine conjoined with small doses of the purified extract of aloes, or with the aloes and myrrh pill, or with the compound rhubarb pill (see F. 575.). The following draught may be used as a stomachic aperient, and varied according to circumstances; or the pills may be substituted, and taken at dinner or at bed time, in a dose sufficient to keep the bowels freely open: —

No. 238. ℞ Corticis Cascarillæ contusi ʒij.; Calumbæ Radicis concisi ʒjss.; Rhei Rad. concisi ℈ij. (vel Folior. Sennæ ʒiij.); Semin. Coriand. contus. et Cardamom. Semin. contrit. āā ʒss.; Aquæ Ferventis ℥ix. Macera per horas duas, et cola.

No. 239. ℞ Hujus Infusi ʒxj.; Potassæ Carbon. ʒss.; Tinct. Aurantii ʒj. M. Fiat Haustus, primo mane, et meridie, cum succi limonis recentis cochleare, in effervescentiæ impetu, sumendus.

No. 240. Pulv. Ipecacuanhæ gr. xij.; Pulv. Capsici ℈j.; Pulv. Rhæi ℈ij.; Extr. Aloës purif. ℈j.; Extr. Fellis Bovini ℈ij.; Saponis Duri ℈j.; Olei Cajeputæ ♏ xx. vel q. s. M. Fiant Pilulæ xl. quarum capiat unam, duas, aut tres, cum prandio, vel horâ somni.

69. The *œdema* and debility of parts consequent on the fit are most marked after a relaxing local treatment, and are frequently such as to require medical aid.—Mechanical support, by means either of a calico or flannel roller, according to the warmth of the season, is generally serviceable, especially if the veins are varicose, or the ligaments weak. The surface of the parts may also be sponged, night and morning, with a strong solution of salt in water, at a tepid temperature; and having been wiped dry, friction should be applied for some time. Frequently, friction should be accompanied by the use of a stimulating and strengthening liniment, consisting of the compound camphor and soap liniments, with the ad-

dition of a little spirits of turpentine and cajeput oil; or *Formulæ* 308. 311. in the Appendix may be employed.

70. *F.* The *Empirical Treatment of Acute Gout* requires merely a brief notice.— *a.* The *eau médicinale, Wilson's tincture,* and *Reynold's specific,* are in most general use as specifics for the cure of gout. The composition of these, however, is not certainly known, although it is generally believed that they are preparations of colchicum of different degrees of strength. Their effects are very nearly the same as those of the tincture and wine of the roots of colchicum; for they all produce, in the dose of a drachm or a drachm and a half, diminished energy and frequency of the pulse, languor, nausea, sickness, terminating either in vomiting or in alvine evacuations, and relief of pain. If the dose be the least in excess — especially in some constitutions — syncope, extreme prostration, cold sweats, violent vomiting and purging, a small feeble pulse, and alarming sinking or insensibility, are the results. *Colchicum,* when employed merely with the view of preventing, or suddenly curing, the paroxysm, and without reference to the removal of the morbid conditions of which it is the external manifestation, is liable to the same objections as are justly urged against the above secret medicines. The consequences of having frequent recourse to them vary in different constitutions, and with the habits and modes of living of the patient: but they commonly are — a much more frequent return of the fit, or of the symptoms indicating its approach; impaired nervous power; debility of the digestive organs; torpor or irregularity of the biliary functions and of the bowels; headachs, and a variety of symptoms referrible to the encephalon. — Besides these, I have met with instances of hypochondriasis, melancholy, mental delusions amounting to insanity, paralysis, and angina pectoris, evidently arising from this cause. I very recently saw a case of partial insanity, with Mr. Shute, occasioned by the use of Wilson's tincture on the approach of the gouty paroxysm.

71. *Veratrum,* or the white hellebore, or some unknown species of veratrum, was much employed by the ancients in gout; and Mr. Moore recommended a wine of this plant with laudanum, believing it to be identical with the eau médicinale. Sir C. Scudamore has referred to instances where it produced dangerous effects. It usually causes irritation of the stomach, with a distressing sense of heat, white tongue, thirst, and nervous depression; and, in a larger dose, severe vomiting and purging, with griping pains, and distressing sinking of the vital powers. In the more moderate doses in which it is prescribed, its effects are not so severe, but then it frequently fails of having any control over the symptoms. — The *Gratiola officinalis,* or hedge hyssop, and the *Ranunculus flammula,* have likewise been employed; but they deserve little credit. A tincture of the former, however, has been said to produce effects similar to the eau médicinale. They are both very active irritants of the digestive mucous surface, and produce purgative and emetic effects. — The *Elaterium* has been given by Mr. Green, in the infusion of senna, with a few drops of laudanum. It has generally produced slight vomiting, and copious alvine evacuations, and speedily removed the fit.—He recommends flannel, fleecy hosiery, &c. to be laid aside, and leeches to be applied, when much inflammation exists in the affected part.—The *Ballota lanata* has been employed by Professor Brera in the form of decoction — half an ounce of it being boiled in a pint of water down to half a pint, which quantity is to be taken daily. It appears to promote the secretions and excretions.

72. *Various other active Medicines* have been employed with the view of removing the fit. Some of these are extremely powerful, and require much caution; others have little influence. The *Rhododendron chrysanthum* has been prescribed by Hoffmann, Koelpin, Buzow, Pallas, Weismantel, and Metternich. It is used principally in the northern countries of Europe; and, when carefully exhibited, is a medicine of no mean efficacy, especially in the more chronic states of the disease. The decoction of *Solanum dulcamara* has been recommended by Carrère, Wanters, and Pressavin; the decoction of the *Sambucus,* by Freitag, Blochwitz, and Gardane; the *Erigeron Philadelphicum,* by Barton; *Digitalis,* by Hoffmann and Gapper: the decoction of the *Ilex aquifolium,* by Frize, Reil, Dreysig, and Bandelow; and the decoction of the *Hedera terrestris,* by De Heide and Cartheuser. Of these, the *sambucus* seems most deserving of use, the berries and bark being the most active parts.

73. The above substances act energetically upon the digestive mucous surface, and promote the secretions and excretions; but, when exhibited in large doses, they also inflame this surface, impair the organic nervous energy, powerfully affect the brain and the rest of the cerebro-spinal system, and lower the sensibility. They should, therefore, be given with great discrimination and caution. Where the powers of the constitution are materially weakened, and the organs of digestion in a state of irritation, they ought not to be employed. Their influence on the paroxysm is chiefly to be attributed to the above modes of operation — to the copious evacuations they procure from both the liver and digestive mucous surface—and partly to their action on the nervous system.

74. *b.* The *Portland gout powder* once had great reputation for preventing the return of the fit. It consists of the roots of birthwort, and of gentian, and of the tops and leaves of germander, groundpine, and centaury. These are well dried, powdered, and sifted, and mixed together in equal weights; a drachm being taken every morning fasting. Dr. Clephane has instituted a learned inquiry into the origin and use of this powder. Having continued this quantity for three months, a dose of three fourths of a drachm is given for another three months, and half a drachm afterwards for six months. This medicine differs but little from some mentioned by Galen, Cælius Aurelianus, Aëtius, and others of the ancients; and which appear to have been brought into notice for a time, and then to have fallen into neglect, owing to their pernicious influence. Indeed, Cælius Aurelianus remarks, that he has seen gouty persons, who frequently used bitters, carried off by apoplexy; and the same remark is made by Boerhaave and Quarin. Dr. Cullen states, that where the Portland powder has been long used, the external manifestation of gout was not ob-

served; but symptoms of atonic gout, or apoplexy, or asthma, or dropsy, supervened. He remarks, that the prevention of the disease depends much on supporting the tone of the stomach, and avoiding indigestion; that costiveness, by occasioning this latter, is hurtful and should be avoided; and that much purging is injurious.—The aperients he recommends are, aloes, rhubarb, magnesia, and precipitated sulphur, as they may suit particular cases.—*Sulphur* is recommended for the prevention of the fit by TULPIUS, RULAND, GRANT, GARDINER, and QUARIN. HUFELAND advises it to be conjoined with guaiacum, in a quantity sufficient to act moderately on the bowels. There is no doubt of sulphur and magnesia being both safe and efficacious, in preventing the return of the disease, when aided by suitable diet and regimen.

75. c. *Chalybeates* have been considered as extremely efficacious in preventing the fit, especially when conjoined with the alkaline subcarbonates, and when the bowels are kept open during their use. The preparations of hop are also of service; but they require, equally with chalybeates, quinine, and other tonics, an abstemious and temperate diet, and exercise in the open air. Of tonic, stimulating, and heating medicines, given with the view of preventing the paroxysm, it may be stated, that they are dangerous in the plethoric and robust, inasmuch as they increase vascular fulness and action; and that, if they be resorted to, in such persons especially, abstinence, and the free action of all the emunctories, should be observed. In some cases — particularly in nervous, irritable, and delicate constitutions — a moderate quantity of wine, or either of the tonics in most common use, as the preparations of cinchona, or of the aromatic or bitter substances, or of iron, or of hop, &c., is almost indispensable; but the use of purgatives and the rest of the treatment should also be enforced.

76. ii. *Treatment of Chronic Gout.* — This state of disease has been shown to occur either primarily, or consecutively on the acute. — *A. In the former case,* the powers of the constitution are insufficient to produce the disease in a sthenic form; and either the nervous, or the lymphatic, or phlegmatic temperament, is generally predominant. The *indications* of cure should be founded upon a careful estimate of the condition of the several functions, especially those concerned in excretion. Vascular plethora is seldom present in such a degree as to require general depletion. The imperfect performance of the digestive, assimilating, and excreting functions, and defective nervous power, indicate the employment of medicines calculated to increase these functions. When the biliary secretions are scanty or obstructed, a full dose of calomel, of camphor, or JAMES's powder, and hyoscyamus, may be given at bed-time, and a purgative draught at an early hour in the morning. To these may be added, during the day, saline, aperient, and diuretic medicines, with an alkali, or magnesia. It will frequently be necessary to soothe nervous irritation by the exhibition of a narcotic. The preparations of opium, especially DOVER's powder, or morphine conjoined with camphor or aromatics, will generally give relief, especially after morbid secretions and excrementitious matters are evacuated. But they constipate the bowels; the other narcotics may therefore be tried. It will, however, be found frequently preferable to continue the opiate, and to obviate its effects by one of the stomachic aperients prescribed above, taken early each morning.

77. Tonics, and heating or stimulating medicines, tend rather to fix than to remove the disease; and are always injurious, if excrementitious matters have not been carried off. An alterative and aperient pill, as the hydrargyrum cum creta, Castile soap, and extract of taraxacum; or PLUMMER's pill, with either of the same adjuncts; may be taken at bed-time, and a small or moderate dose of any of the preparations of colchicum in the morning and at mid-day, with any of the stomachic aperients as prescribed above (§ 50. 68.).—In this form of the disease especially, the spiritus colchici ammoniatus is a useful medicine. But either of the other preparations may be used, conjoined with magnesia, or with any of the alkaline subcarbonates, and with saline or stomachic aperients. Sir C. SCUDAMORE recommends a draught with compound tincture of benzoin and magnesia to be given once or twice a day, or the compound decoction of aloes, with an equal proportion of the infusion of cascarilla or of gentian. When the secretions are restored to a healthy state, and debility of stomach with general depression is the principal ailment, gentle tonics, aided by suitable diet, and moderate exercise in the open air, are necessary; but a too full and stimulating diet, or heating regimen, should be avoided. In the summer and autumn, the warm sea bath, twice or thrice a week, will be serviceable.

78. *B. Chronic gout consequent upon the acute,* especially after repeated invasions of the latter have impaired the constitutional powers, is generally attended by obstinate disorder of the digestive and excreting functions, with more or less disturbance of the nervous system. Vascular plethora is oftener present in this variety of chronic gout, than in the preceding; and the local affection is readily increased by the internal use of stimulants; but alterative aperients, conjoined with colchicum and diuretics, as just recommended (§ 77.), will generally be efficacious. When the bowels are very torpid, the purgatives mentioned above (§ 50. 54. 56.) should be given in such doses as may be sufficient. Sir C. SCUDAMORE advises the addition of guaiacum to the purgative in such cases; and, when little or no fever is present, it will prove beneficial. If congestion exist in the liver, head, or kidneys, cupping will be necessary. When pain in the stomach, or tenderness in the epigastrium, is complained of, leeches applied on this region, and followed by a rubefacient epithem, or blister, will be requisite. If the urine be scanty, high-coloured, and thick, cupping over the kidneys, and the use of active diuretics, will be of great service. Besides the saline substances already noticed, small doses of turpentine, or a decoction or infusion of the pine sprouts or tops, as directed by BARTHEZ, may be given at short intervals; or the preparations of juniper, or the sweet spirits of nitre, may be added to saline and alkaline medicines. When the liver continues torpid, or the bile deficient, and the urine thick, the compound calomel pill, with soap, should be given at night, and the extract of taraxacum added to the medicine prescribed during the day.

79. Having removed the more urgent phenomena, the treatment should be directed to the restoration of the healthy actions of the emunctories, and of the digestive organs, as insisted on with reference to the other states of the disease.— But unless an abstemious diet and temperate regimen be observed, and be aided by regular exercise in the open air, disorder of these organs will soon return, and the gouty affection afterwards reappear.— When the nervous system has become very susceptible, and the parts affected more or less changed in structure, the object, after the removal of the internal disorder, is to invigorate the nervous system, and restore the parts as far as possible to the healthy state. Unless this end be accomplished, so as to allow the patient to take sufficient exercise, recurrence of the disease can hardly be prevented; and, although the digestive and excreting functions may be preserved in a healthy state, the affection will assume more or less of a rheumatic character; or rheumatism will be associated with it; and the patient will be injuriously impressed by every change of weather, and by every exposure. Where this state of disorder occurs, small doses of DOVER's powder, either alone or with camphor, and a judicious recourse to aperients with tonics, will prove beneficial. *Sulphur*, either alone or with guaiacum, as recommended by HUFELAND; and the compound decoction of sarsaparilla, with the *liquor potassæ*, or with *hydriodate of potash*, or with both, aided by the external applications about to be mentioned, will also be serviceable in these cases.

80. *C.* The *local treatment in chronic gout* should claim attention as soon as the more urgent disorder subsides.—*a.* The vapour bath frequently increases the weakness of the parts; but sponging the surface with a strong tepid solution of salt in water, is often of service.—*Frictions* with slightly stimulating liniments, as the compound camphor, and compound soap, liniments conjoined, are generally beneficial; and to these may be added, in the more indolent cases, spirits of turpentine and cajeput oil. Frequent or continued frictions are of the greatest benefit, and should be employed in the intervals between the use of liniments. When œdema remains, and the sensibility of the parts has subsided, the tincture of *iodine* may be applied over the surface with a camel-hair pencil. — *Electricity*, especially sparks drawn from the part, has been advised in such cases by QUELMALZ, NEIFELD, SCHAEFFER, BAUMER, DE HAEN, VOGEL, and SIGAUD LA FOND; and *galvanism*, by WALTHER and BISCHOFF. Of the efficacy of these, however, I can give no opinion. Suitable support of the parts by bandages, or by laced stockings, is generally of service. Of the use of mineral baths, &c., mention will be made in the sequel. But whatever external means are employed, ought to be preceded and accompanied by internal treatment, otherwise little permanent advantage will accrue; or even the external affection may be thereby merely suppressed, and internal disease either produced or increased.

81. *b.* The *gouty concretions* are seldom removed even by the aid of external treatment. Mr. MOORE states, that pressure ought not to be applied to them; and that their removal by the knife should not be attempted. He, however, admits that a small puncture of the cuticle may be made, and that caustic may be applied when they have penetrated the cutis. The application of cajeput oil was recommended by HUFELAND and ABRAHAMSON; but it is more advantageously used with the spirits of turpentine and the compound soap liniment. J. P. FRANK advises soaps rendered emollient in almond or other oils, with the addition of camphor. Sir C. SCUDAMORE directs the liquor potassæ, diluted by an equal quantity of almond milk, to be rubbed over the part twice or thrice daily; and calcined magnesia and liquor potassæ to be given internally in almond emulsion, or in any other vehicle suggested by the state of the internal functions. It is necessary, however, that this plan should be persevered in, and that the functions of the stomach and liver should receive strict attention. Regular exercise in the open air ought also be taken, as advised by SYDENHAM, and found beneficial in his own case.

82. iii. *Treatment of Irregular Gout.*—I have shown above, that gouty affections may be irregular in three different ways.—(*a*) The precursory disorder may be of an irregular, prolonged, or unusual character, and ultimately be followed by the external affection; — (*b*) or the disease may commence in its usual manner, suddenly disappear, and affect some internal viscus;—(*c*) or it may seize at once upon some internal organ, and either exhaust itself, or be remedied by treatment without any external affection appearing in its course, or it may destroy the patient. — The *first* and *third* of these varieties require the same treatment, modified according to the character and seat of the internal affection. I shall therefore consider, in the first place, the means most appropriate to the disorders connected with the retrocession or suppression of the external affection.

83. *A. Retrocedent Gout.* — In no disease is discrimination, on the part of the physician, more necessary than in this; for upon the inference that is formed as to the existence of inflammation or of spasm, and as to the degree in which either is present, the life of the patient depends. — *a.* In nervous and weak constitutions, a *spasmodic* or *nervous character* is generally predominant, as indicated by the weak, or irregular, or unaccelerated pulse, and by the ease derived from pressure, &c. In these, energetic stimulants or antispasmodics, with anodynes or narcotics, or even warm brandy and water, are required. In other cases, a mixed affection, or a state of congestion, may be inferred; and in them, the remedies just mentioned may not be injurious, but additional means are required, especially alvine evacuations, external derivatives, or even local depletions. When the retrocession appears to have been caused by indigestible matters, an emetic should be exhibited, conjoined with a warm cardiac, as capsicum, ammonia, or camphor; and if nausea and vomiting be present, a full operation should be procured by warm water, or by the infusion of chamomile flowers. If the stomach or bowels are principally affected, a full dose of calomel, with camphor, hyoscyamus, or opium, should be given; and, two or three hours afterwards, one of the purgative draughts already prescribed, which should be aided in its operation by a cathartic enema containing turpentine, assafœtida, or camphor. — If suffering

still continue, the calomel, camphor, and opium may be repeated, after an interval short in proportion to the severity of the case; the feet should be plunged in hot water to which a large quantity of mustard flour and salt are added, or be enveloped in sinapisms; and flannels wrung out of very hot water, and soaked with spirits of turpentine, should be applied over the abdomen; or croton oil rubbed over the stomach. Sir C. Scudamore directs the saline draught with colchicum to be given and repeated; but I doubt the propriety of giving this medicine in cases of consecutive gouty affection of the stomach or intestines.

84. *b.* Although the internal affection will often assume a nervous or spasmodic character — especially in the constitutions mentioned in connection with it, and at the commencement of the seizure, before vascular reaction has taken place — yet *active congestion* or *inflammatory determination* is not infrequent, particularly in more plethoric and irritable habits. — Much care and discrimination are required to ascertain the presence or absence of these states; and either is to be inferred chiefly from the causes of retrocession, from the state of the pulse and of vascular repletion, and from the tenderness, fulness, or tension, and temperature, of the regions containing the affected organ. The patient's sensations, and the symptoms connected with the excreting functions, ought also to be carefully estimated If, from these, *inflammatory action* of the stomach, intestines or kidneys be inferred, bloodletting, according to the strength and habit of body of the patient, must be promptly put in practice. But vascular depletions are neither so well borne in such cases, nor so successful, as for inflammations occurring primarily, or in previously healthy persons. The amount and repetition of depletion must depend entirely upon the circumstances of the case; but, in every instance, depletion should be aided by the derivatives and hot epithems just recommended. A full dose of calomel, with a few grains of camphor, and two of opium, should also be administered, and repeated within two or three hours, if indications of relief are not observed. After one general bloodletting, local depletion by cupping or leeches may be employed, and repeated in severe cases, or in plethoric persons. In some instances, the powers of the circulation can bear only local depletions. — When much flatulent distension, and severe colicky pains, either attend the internal seizure, or remain after the above means are employed, equal parts of oil and turpentine and of castor oil (ʒiv. to ʒvj. of each) may be given on the surface of an aromatic water, with or without a warm tincture, or aromatic spirit; and an enema containing the same oil may be administered a few hours afterwards, to promote its operation.

85. *c.* The internal attack, although nervous or spasmodic at its commencement, may become congestive, or even inflammatory, as vascular reaction supervenes. This fact should not be overlooked; for the seizure that is benefited by stimulants at the beginning, owing to this circumstance, may require depletions in its progress. The internal affection may even present a *mixed character* — one in which it is difficult to determine whether the nervous, or the spasmodic, or the congestive, or the inflammatory symptoms predominate. In these cases, it will be necessary to have recourse to antispasmodics and narcotics or anodynes, whilst vascular depletions and evacuations are being employed. — Having treated several cases of retrocedent gout, and being thereby induced to observe closely, and to reflect upon, the phenomena attending it, and the effects of the treatment adopted, I am morally convinced, that exclusive views as to either the nervous or the inflammatory character of the internal affections, are incorrect; and that it requires the utmost acumen on the part of the practitioner to discriminate between these states, and to detect their varying shades. In the more spasmodic forms of these affections, especially when implicating the stomach, opium and camphor are most valuable remedies; but I have seen great benefit also accrue from hydrocyanic acid given in repeated doses with camphor and aromatics.

86. *d.* When the consecutive seizure is experienced in the *heart* or *lungs*, the same principle of practice should be observed. When the *heart* is affected, the restlessness, anxiety at the præcordia, and alarm of the patient, are most distressing. I have lately seen two cases of this kind. In both, the action of this organ was frequent, irregular, fluttering and weak; in one, it intermitted every fourth beat, the three intervening strokes being successively weaker. In both these I am convinced, from the character of the symptoms, that depletions would have caused a fatal result. Camphor and opium, with aromatics and external derivatives, were prescribed for both, and in a few hours the affection was removed. In the cases also referred to above (§ 19.), this and similar modes of practice were equally beneficial.

87. *e.* When *apoplectic, epileptic,* or *convulsive* seizures follow the retrocession of gout, vascular depletion is frequently requisite, especially in apoplexy. But, even in it, discrimination is imperatively called for. If the head be cool, and the action of the carotids weak, an entirely opposite treatment to depletion is required.— In the *epileptic* or *convulsive seizures*, depletions are often unnecessary, and sometimes injurious. Even when manifestly indicated, they require much caution, and ought not to be prescribed in large quantity. In both the apoplectic and epileptic attacks, purgatives, and cathartic enemata, energetic derivation to the lower extremities, and camphor, are beneficial; but narcotics should be withheld, especially in the former, although, when conjoined with antispasmodics and cardiacs, they are sometimes of service.—When the retrocession of gout has been caused by cold, vascular depletion is more frequently useful, than in other circumstances; but the utmost caution is necessary as to the extent to which it is carried. Derivations by sinapisms, mustard pediluvia, croton oil, &c., however, ought to be most actively employed.

88. *f.* If the *kidneys* or neck of the *bladder* are affected upon the retrocession of gout, the treatment will depend entirely upon the concomitant phenomena. If the urine be suppressed, or pain or tenderness be felt in the region of the kidneys, or numbness in one or both thighs, cupping on the loins, followed by a blister in the same situation, will be requisite; but the latter should be removed after a few hours, or sinapisms substituted. — Derivation to the lower extremities, and small doses of camphor internally, with diuretics,

ought also to be prescribed.— Where the neck of the bladder becomes affected, leeches applied to the perineum, the semicupium, and the internal use of alkalies, with camphor and anodynes, or with mucilaginous and diuretic medicines, should be employed.

89. *B. Misplaced Gout* (§ 21.), or those severe affections of internal organs which threaten the life of the patient, and are either followed by the regular disease, or run their course without any external affection, although occurring in persons who have previously had gout, must be treated very nearly according to the principles stated above. If vascular depletion require cautious discrimination in retrocedent gout, it still more imperiously demands it in cases of this kind. — *a.* Any internal organ may be the seat of misplaced gout, or in other words, the internal viscera are disposed to severe disorder in gouty constitutions; but the stomach, bowels, heart, brain, and kidneys are most frequently affected. Gouty persons are often affected by spasms of the stomach and colic, after exposure to cold, or after partaking of cold, acid, or improper food. For these cases, large draughts of warm water, and stimulant and cardiac medicines, or warm brandy and water, are suitable means. In some, the disorder alternates between the *stomach* and *heart*; or the flatulence attending upon the affection of the former, induces palpitation or otherwise disordered action of the latter, with inexpressible anxiety. A gentleman who had suffered attacks of gout, but had escaped them for some years, was subject to disorder of the stomach, to severe headachs, and to alarming and sudden affections of the heart, the action of which was fluttering or tumultuous; and the anxiety and suffering referrible to it, most distressing. He was lately seized with one of these attacks at a party. He was assisted into his carriage, and was brought to my house after midnight. The affection approached the characters of angina pectoris, but I inferred its aggravation by flatulence: I therefore prescribed a warm carminative medicine. Whilst this was being procured, I directed the patient to swallow a few of the small pods of capsicum. Flatulent eructations and instant relief were the consequences. In a few minutes afterwards he walked unaided to his carriage.

90. A gentleman well known in the profession had some years ago experienced imperfect manifestations of gout in the lower extremities, connected with affection of the digestive organs. Recently after a severe domestic affliction, he was seized with distressing disorder of the stomach and heart, with anxiety, alarm, and nervous irritation. Dr. ROOTS and myself agreed as to its nature; and prescribed anodynes with antispasmodics, aromatics, and alkaline subcarbonates. The excretions received due attention, and external derivatives (§ 83.) were employed. Whilst improving under this treatment, he was suddenly affected by an alarming increase of the disorder of the heart. His pulse had become weak, irritable, and intermitting; the impulse of the heart was feeble, but unaccompanied by any anormal sound; his countenance was expressive of distress; and he was constantly changing his position. A draught, containing two drops of hydrocyanic acid with camphor, aromatics, and capsicum, was prescribed, and repeated in an hour, and derivations by sinapisms resorted to. He obtained relief in a few hours, and continued improving for two or three weeks afterwards; when he had a second attack in the night, for which camphor and ammonia, with opium, were given him, and carminatives with magnesia. He was immediately relieved, and has continued afterwards to improve; the subsequent treatment consisting of a combination of anodynes and restoratives, and of stomachic aperients.

91. *b.* When apoplectic or epileptic seizures, or diseases of the kidneys or bladder, thus occur in persons who have previously had fits of gout, the treatment should be guided according to the principles just developed. — *Apoplectic* and *paralytic attacks* are very common in gouty persons far advanced in life, and who have been long without a regular paroxysm. In these, depletions are not so generally beneficial as in other circumstances, although they are often required; the energetic exhibition of purgatives and of cathartic enemata, and the application of sinapisms to the feet, &c., being much more generally appropriate. — When *epilepsy* or *convulsions* appear in gouty persons, depletions are hazardous; antispasmodic and purgative enemata and derivation being much more useful. Whatever organ becomes diseased in such persons, the treatment must be guided by the state of the pulse, the signs indicating the nature of the complaint, and the age and strength of the patient; for although large depletions may be necessary in some cases, yet they will certainly destroy the patients in others, although the disorder and its seat are apparently the same. When the disease presents unequivocally inflammatory characters, or when the patient has been highly fed, or is plethoric and robust, bloodletting cannot be dispensed with; the question being, as to the extent to which it should be carried; and, as to this, the practitioner must decide for himself, and be guided by the peculiarities of the case. In the gouty constitution especially, it cannot be trusted to alone, or even principally, unless in robust and plethoric persons.— When apoplexy is *complicated* with gout, the former occurring during the paroxysm, or without the disappearance of the latter, bloodletting and alvine evacuations should be prescribed with an energy suitable to the circumstances just adverted to. Such cases are, however, comparatively rare.—I have never known of an instance of epilepsy whilst the gouty paroxysm continued, although I have seen it take place upon the retrocession of the fit, and in gouty persons. VAN SWIETEN remarks, that, in cases in which he has seen an epileptic seizure in the gouty, the occurrence of a regular paroxysm of gout has prevented a return of the epilepsy.

92. *c.* As to the employment of *colchicum* in cases of retrocedent or misplaced gout, recent writers have stated nothing in which the practitioner can confide. When the stomach is weak, the nervous power depressed, and the pulse irritable, it is generally injurious: when inflammatory seizures occur, either upon the sudden disappearance of the external affection, or in the gouty constitution, it may be employed: and the advantage proceeding from it will be in proportion to the degree of sthenic action indicated by the pulse. Yet cases will sometimes occur, in which this medicine cannot be endured, although indi-

cations of vascular fulness and of increased action are present. A gentleman of regular habits, and of a full and large make, had the consequences of chronic gout in his lower extremities, but had not experienced a regular paroxysm for some years. My attendance was required on account of determination of blood to the head. The excretions were free, bilious, and natural. Desirous of removing the disorder by active alvine evacuations, I conjoined small doses of colchicum with the purgatives; but they occasioned a distressing sense of sinking at the epigastrium, and nausea. I soon afterwards found that depletion could not be dispensed with; and nearly thirty ounces of blood were taken from the nape by cupping, without any tendency to syncope; and he soon recovered.—In all cases of doubt, this medicine should be prescribed in small doses, which may be increased; but, as with digitalis, an accumulating effect may result; and it ought to be carefully watched. When, however, increased vascular action exists, in the irregular forms of the disease, it may be cautiously used.

93. Dr. Barlow remarks, "that the complex conditions and alleged varieties of gout are referrible not intrinsically to gout, but to the state of constitution in which it occurs." This is all that is meant; for no modern pathologist intends to convey any other idea than that internal affections supervening in that state of constitution which occasions gout, are generally more or less modified by this circumstance. It is to the improvement of this state of constitution, that treatment should be directed; and, after arriving at rational inferences as to its nature, the means of cure will readily suggest themselves. — Having seen that the constitution or diathesis, which has been called gouty, in order to prevent circumlocution, consists in debility associated with imperfect secretion and excretion, and consequently with fulness of blood or with redundancy of excrementitious matters — the ultimate products of assimilation in the circulation — the treatment should obviously be directed with reference to the predominance of either of these states. Although what has generally been called misplaced gout, may thus be viewed as internal affections occurring in the gouty diathesis, and although they sometimes present little deviation from those appearing in other circumstances, yet a very remarkable difference is often observed — the symptoms being very different, and often peculiar, and the juvantia and lædentia being also different.—The predominance of debility and spasm in many of these affections induced Sprengel, Cullen, and Schmidtmann to prescribe *musk* for them; and the success of the treatment is a presumption of the justness of their views, at least in respect of the cases in which it was employed. — In addition to other stimulants and antispasmodics successfully resorted to in similar circumstances, most of which have been noticed above, I may state, that a solution of *phosphorus* in ether has been advised by Trampel and Hufeland; *aconitum* and *nux vomica*, by Stoerck, myself, and others; the spirits of *turpentine*, by Theodosius and Good; and large doses of *olive oil*, by Brefald, Marino, and Malacarne. If turpentine, however, be resorted to, castor or olive oil should be given with it, in a quantity sufficient to produce a full operation on the bowels; and the same combination ought to be administered as an enema, in order to promote this effect. Neither of these substances, however, nor camphor, ammonia, ether, opium, nor any of the other stimulants and antispasmodics previously mentioned, should be confided in alone, or unaided by active and persevering external derivation.

94. iv. *Of Mineral and Thermal Waters in Gout.* — Mineral waters are beneficial — 1st, by preventing a return of the paroxysm; 2dly, in cases of atonic and misplaced gout, by giving tone to the digestive and assimilating functions, and thereby either removing the internal affection, or enabling the system to develope the disease in the extremities. — *a.* Respecting the *Bath waters,* Dr. Barlow makes several very judicious observations. In gouty cases, he remarks, especially where the stomach is very weak, and requires some substitute for the wine and stimulants relinquished, the Bath waters give tone to the stomach, improve appetite, and renovate strength. They thus accomplish unequivocal good, not by the mere establishment of gout in the extremities, but by reducing it to its simpler and more manageable state through the amendment effected in the general health. In general, it may be inferred, from what has been written on Bath waters in gout by Falconer, Gibbes, Barlow, and Scudamore, that they are either injurious or of little service, where plethora, disease of the liver, or determination to the head exists, and that these states should be removed before they are resorted to; but that they are of service in debilitated, nervous, and irritable habits; and for those anomalous or internal affections frequently attacking gouty constitutions. When these affections occur in weak and nervous persons, and are unconnected with plethora, or active visceral disease, the internal and external uses of these waters are beneficial, especially if due attention be paid to the excreting functions.—When gout has debilitated the limbs, and weakened the constitution, so that the nervous system is depressed, and the circulation languid, a course of warm sea-bathing, with frictions of the weakened limbs, and sea air, may be tried, or may precede the use of the waters of Bath or Buxton.—Where swellings are seated in the vicinity of the joints, the Buxton baths, or pumping of the Buxton waters on the affected parts, are generally serviceable, especially if proper friction and shampooing be used immediately afterwards.—*b.* Sir C. Scudamore observes that the waters of *Cheltenham* prove highly beneficial to gouty persons, particularly when conjoined with alteratives and proper regimen. When the precursory symptoms are tedious, or assume the form of what is usually called misplaced gout, their stimulating properties often excite a paroxysm, but it is generally slight. The water No. 4. seems most suitable to gouty patients, especially at the commencement of a course of these waters. —*c.* The waters of *Leamington* and *Harrowgate* are not much inferior to those of Cheltenham, when they act sufficiently on the bowels, or when their operation is aided by aperients. They seem, however, in the circumstances just alluded to, to have considerable influence in exciting a fit of the disease.

95. *d.* The *artificial mineral waters* at Brighton, especially the *Seidschutz*, the *Marienbad*, the *Ems*, and *Carlsbad* waters, may also be employed

in the more chronic or misplaced states of the disease.—The waters of *Wiesbaden* are much used, both internally and externally, in atonic or misplaced gout, as well as others of the *Nassau* springs; but they are not superior to the mineral waters of our own country. — *e.* Piso, Zecchius, Baglivi, and Saunders consider the warm mineral waters recommended in gout as little superior to common pump water heated to the same temperature. They advise from half a pint to a pint of common water, of a temperature from 90° to 114°, to be taken, and succeeded by moderate exercise every morning before breakfast. Dr. Saunders states that, in anomalous gout, it allays the irritation of the stomach, and diffuses a generous warmth in the extremities; and that, if taken at night, it conduces to sleep.

96. v. The *Prevention of Gout* consists chiefly in the careful avoidance of the predisposing and exciting causes, and of acidity of the *primæ viæ*. An abstemious diet, and a small quantity of animal food, are requisite. Some writers, as Stark, Redi, and Lobb, recommend the adoption of vegetable food only; but this restriction is not necessary. Temperance is equally important: unless it be strictly observed, no other means of prevention will be permanently of service. Regular exercise on foot, or on horseback, so as to promote the excretions, is likewise beneficial. Moderation of all the passions and affections of the mind, and avoidance of too intense or prolonged mental application, have been insisted on by most writers; the latter especially by Sydenham and Good. If abstinence, however, be adhered to, and moderate exercise be taken, mental application is seldom injurious. — Flannel clothing next the skin, by promoting the excreting function of this surface, is very serviceable. All vicissitudes of temperature, and exposure to cold, wet, humidity, or changeable weather, ought to be avoided. The feet should be kept dry and warm; and, with the legs and knees, be sponged every morning, as advised by Sir C. Scudamore, with a strong solution of salt in water, of a tepid or slightly warm temperature. If the limbs be weak, pained, or the parts thickened, frictions may be afterwards used. Dessault directs the limbs to be well rubbed night and morning with the hands covered with strong worsted gloves, and states, that a man at seventy had gout; was cured, and remained free from it ever after, owing to this practice, although he lived to 100 years. Sir W. Temple says, that no man need have gout, who can keep a slave to rub him. Cold bathing is hazardous for gouty persons, unless active frictions be employed immediately afterwards; but tepid or warm salt-water bathing is useful. Of the kind of food most serviceable in gouty cases, little further need be stated, than that the easiest digested is the best. Rich dishes and sauces, acids and pickles, pastry, heavy puddings, much butter, and the richer kinds of fish, as salmon, &c., should be shunned.

97. The medical means of prevention have already been noticed (§ 67.). They consist chiefly of medicines calculated to promote the secretions and excretions, and restore nervous energy. Means producing this latter effect only are injurious if they be not conjoined, or alternated, with those causing the former.—Magnesia has been much employed as a prophylactic, and is amongst the medicines that can be employed, either alone or with rhubarb. Its daily use has been dreaded, since Mr. Brande published the accounts of two cases, in which it formed concretions with the mucus of the intestines. But this occurrence is very rare; and, if more active purgatives be occasionally employed, not likely to occur. Lime water and the alkalies have also been prescribed as prophylactics; but the alkalies, when continued long, weaken the stomach and relax the digestive mucous surface. The use of a dinner pill such as I have directed above (§ 68.), or prescribed in the *Appendix* (F. 562.), is more safe, and is generally beneficial.

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GRAVEL. See Urine, &c.

HÆMORRHAGE. — Syn. *Αἱμοῤῥαγια* (from *αἷμα*, blood, and *ῥήγνυμι*, I break forth), *Αἱμοῤῥοια* (from *αἷμα*, and *ῥέω*, I flow), Gr. — *Sanguinis Profluvium*, *Sanguifluxus*, Auct. Latin. *Hæmorrhagia*, Sauvages, Cullen, &c. *Hæmorrhœa*, Swediaur, &c. *Cauma Hæmorrhagicum*, Young. *Profusio*, Linnæus. *Hémorrhagie*, *Flux de Sang*, Fr. *Das Bluten*, *Blutfluss*, Germ. *Emorragie*, *Flusso di Sangue*, Ital. *Hæmorrhagy*, *Bleeding*.

Classif. — 1. *Class*, Febrile Diseases; 4. *Order*, Hæmorrhages (*Cullen*). 3. *Class*, Sanguineous Diseases; 4. *Order*, Cachexies (*Good*). II. Class, III. Order (*Author*, in *Preface*).

1. Defin. — *The discharge or escape of blood from the vessels or channels in which it circulates in the healthy state of the body.*

2. *Hæmorrhage* may take place from the heart, the arteries, the capillaries, or veins, in consequence of disease or of external injury. It may proceed from the capillaries without any obvious lesion, excepting an almost inappreciable dilatation of them; or from the vessels formed in adventitious productions, as from fungoid, carcinomatous, and erectile tumours. It is more or less intimately connected with, and even dependent upon, the state of vital power and of vascular action, and upon local or general plethora, especially when proceeding from capillary vessels.

3. Although the definition given above comprises all the various kinds of hæmorrhage, yet I will confine myself to the consideration of those states of it which fall more especially under the cognisance of the physician. Whenever the red particles of the blood escape from the vessels to any very evident amount, hæmorrhage may be said to exist: and this inference is admissible in whatever situation the extravasation takes place — whether on mucous or serous surfaces, in the parenchyma of organs, or in any of the compound structures of the frame. All parts of the body may become the seats of hæmorrhage, excepting those which are extremely dense, as the bones, cartilages, ligaments, tendons, &c.

4. Although hæmorrhage may take place from any part of the circulating system in consequence of injury or of disease, yet it oftenest proceeds from the minute vessels distributed in mucous or serous membranes, or in the parenchyma of organs, as an exhalation or exudation from their extremities or pores. Before the time of Morgagni, as M. Chomel has remarked, it was ascribed to the rupture of a blood-vessel; and the same doctrine was very generally received until Bichat and Laennec confirmed the views of this celebrated pathologist. Cases, however, often are met with, in which it is very difficult to determine whether the hæmorrhage proceeds from exhalation or from a ruptured or diseased vessel; and, even on inspection after death, the most intimate examination is requisite to the ascertaining of its source.

5. The discharge of blood from capillary vessels, in the form of exhalation or exudation, has been very generally viewed as depending upon a state of those vessels different from that which constitutes inflammation. This doctrine has been recently controverted, particularly by Lefebvre and Broussais; and the following points, in which hæmorrhage closely resembles inflamma-

tion, have been adduced in proof of their very intimate connection, if not of their identity: they both very frequently arise from the same predisposing and exciting causes; both are idiopathic or primary, and symptomatic or consecutive; both are either sthenic or asthenic, acute or chronic, active or passive; they both affect chiefly the same organs; and both require the same treatment. Notwithstanding these resemblances, hæmorrhage is far from being the same disease as inflammation, as will appear in the sequel (§ 13. 15.).

6. In a great majority of instances, hæmorrhage is merely a symptom, contingent upon a variety of affections, the primary ailment being chiefly important to the physician. This is the case, no less when it takes place as an exhalation from mucous surfaces, as when it occurs from disease of the vessels, or into serous cavities, or the parenchyma of organs. — If we enter into an analysis of the pathological relations of hæmorrhages, we shall find that, in comparatively few cases, are they strictly primary or *idiopathic*. This term, therefore, must have a relative acceptation as regards them. Even when proceeding from the capillaries of mucous surfaces, and when perfectly independent of organic lesion of the vessels or of that surface, hæmorrhage is a consequence of antecedent changes; and it is indispensable to the due consideration of the subject, that the nature of these changes should be understood. They may be referred to four general heads; namely — 1st. To the states of organic nervous power and vital action; — 2d. To the state of structure in which the hæmorrhage takes place; — 3d. To the state of the circulating organs and vessels; — 4th. To the conditions of the blood; — and, 5th. To any two or more of these conjoined.

7. i. *Of the States of Organic Nervous Power, or Tone, and of Vascular Action, in Hæmorrhages.* — Although nervous power may be either excited or depressed in the seat of hæmorrhage, it is rarely the former, even when vascular action is increased, unless an irregular distribution or determination of it to the part take place, from its suppression in some other situation, or from local irritation. Vascular action, however, is much more frequently increased than depressed, not only in the part, but throughout the system; and this increase is generally much above the state of organic nervous power or tone. Owing to this circumstance — to the deficient tone of the extreme vessels, and to the imperfect resistance opposed by them to the increased action of the heart — is to be attributed, in part, the occurrence of hæmorrhage; or, in other words, vascular action overcomes the resistance opposed to it by the vital tone of the capillaries of the part in which hæmorrhage takes place. The frequent increase of action in this class of diseases induced Dr. Cullen to arrange them amongst febrile complaints. But this increase is not general; and, even when it exists, it is often consecutive upon, or produced by, the sanguineous discharge. — When hæmorrhages are accompanied by excited action, the vascular excitement is frequently manifested chiefly in the parts affected, and in those adjoining them, in the form of active determination or congestion. Thus, in epistaxis, hæmoptysis, hæmatemesis, hæmorrhoids, &c., there is excited action in, or determination to, the organs or structures in the vicinity of the surface from which the blood is discharged, although the circulation in other parts of the frame may be natural, or even below the usual standard. This circumstance, in connection with the antecedent and concomitant phenomena of hæmorrhages, indicates an irregular distribution of vital action, generally attended by deficient organic nervous power or tone — an increase of vascular action in certain parts, and a diminution of it in others, rather than a state of general febrile commotion. In many instances, also, more especially in the symptomatic varieties, the extravasation is unaccompanied by increased action, and, as we shall see hereafter, is more frequently the result either of a morbid condition of the textures, or of the vessels themselves, or of impeded return of the blood, in connection frequently with plethora, local or general, and with other morbid states about to be noticed.

8. Whilst, however, we observe, thus frequently, an irregular distribution of vital action through the frame, the increased action, when increase exists, being in the seat and vicinity of hæmorrhage, it must be admitted that febrile commotion also sometimes exists and ushers in the sanguineous discharge. It would seem as if, in many of these cases, the febrile excitement accidentally produced, had given rise, owing to the increase of the *vis à tergo*, to the extravasation; the impaired tone of the extreme vessels being insufficient to antagonise the action of the heart.

9. In many cases, the hæmorrhage is altogether the result of irritation, particularly when applied to a mucous surface; but, in these, the sanguineous discharge is very slight, or is merely a part of the evacuation that takes place. Here the extreme vessels become enlarged or dilated, owing to that state of vital expansion which mucous and erectile tissues assume when subjected to irritants or stimuli. From the expansion thus induced, an increased momentum of blood in the enlarged capillaries, and the determination of the circulating fluid to this quarter, necessarily result. If we apply any irritating substance to a mucous surface, the nerves of the part are excited, their vital manifestations are at first augmented, and the capillaries are ultimately expanded or enlarged; the tissue assuming more or less of increased volume. This erectile state, which all vascular parts present in a greater or less degree, according to their vascularity, and the extent to which they are supplied with organic nerves, generally subsides when the irritation is withdrawn; but if it continues to act energetically, and especially if it affect the action of the heart, and thereby occasion general irritation or febrile commotion, the expansion of the extreme vessels may proceed so far as to solicit, upon hydraulic principles, so great a flux of blood through them as may overcome their power of vital resistance, or may occasion the exudation of this fluid through their pores, which, owing to their distension, acquire an increased diameter, and allow the red particles of the blood to exude. This result is still more likely to occur, when organic nervous power is deficient or depressed, as it frequently is in the constitutions and circumstances in which hæmorrhages occur.

10. The effect thus produced by material irri-

tants may take place from an excited state of the organic nerves supplying the tissue — the primary affection being in these nerves, and occasioning the vital expansion of the capillaries, the increased afflux of blood to these vessels, and all the contingent phenomena. Such appears to be the procession of morbid changes in many cases of active hæmorrhage of an idiopathic or primary kind. The first change takes place in the organic nerves of the affected part, and occasions the vital expansion of the capillaries, and thereby an increased flux of blood through these vessels, and the larger trunks supplying them; the excited state of the nerves, and the increased action of the vessels, being propagated to the heart through the medium of the organic nervous, and vascular systems. Thus febrile commotion is induced in the more active forms of hæmorrhage. If we attend closely to the symptoms in such cases, we shall find a sense of titillation, and of increased heat, with throbbing of the vessels, &c., ushering in the discharge of blood. These symptoms clearly indicate the first change produced on the organic nerves, and its effects upon the circulation of the part. At last the blood pours forth, and shows that the tone or power of resistance in the extreme vessels has so far yielded to the increased momentum of blood, as to allow the escape of a portion of this fluid through the pores of these vessels, and of the tissues in which they ramify; the vital cohesion of the tissues either being originally weak, or having become weakened by pre-existent disease, as in the case of consecutive hæmoptysis, or of hæmorrhage occurring in the course of fevers.

11. From this it will be seen, that, in active hæmorrhage, more or less excited action exists in the seat of the discharge, and, when it commences in this seat, it is propagated to the heart in the manner above stated. The mere demand which is made upon the heart by the augmented afflux of blood solicited by the dilated and discharging capillaries, is insufficient to account for the characteristic phenomena of this form of disease, without calling into aid the organic nervous influence, and the reaction consequent upon the sudden depletion of the vessels during a state of plethora. It will explain increased rapidity of the pulse, but little more. Whilst, however, I thus contend for the frequency of excited action in the seat of hæmorrhage, often confined chiefly to that situation or its vicinity, or extended more or less throughout the frame, and assuming various grades of activity, it must not be overlooked that this action is generally attended by impaired nervous power or tone, and weakened cohesion of the extreme vessels and tissues in which they ramify. In proportion to the feebleness of vascular action, and to the loss of vital tone and of cohesion of the capillaries and tissues, will the hæmorrhage present more of an asthenic or passive character. But there is no absolute or unvarying grade, to which the terms sthenic or active, and asthenic or passive, can be applied; but every degree of action, as well as of diminished tone, either above or below the healthy standard, will present itself in practice. This association of excited vascular action and capillary expansion, with weakened nervous tone and vital cohesion, argued far above, is fully evinced by the state of the pulse, which, in most hæmorrhagic diseases, is broad, open, compressible, soft, and sharp; the parietes of the artery being felt as if yielding to the impulse of the heart, but quickly reacting upon the momentum with which the current of blood is propelled; thus imparting a sharp, or bounding, or jerking character to the pulsation.

12. It is not only an irregular distribution of organic nervous power, with vascular excitement and deficient tone, by which hæmorrhages are frequently characterised; but the diminished cohesion of the extreme vessels, and of the tissues in which they ramify, above alluded to, is often the prominent feature of the pathological conditions in which these diseases originate.—This diminution of vital cohesion in the part is generally associated with debility; and with weak, although frequent, or even excited, action of the heart; the phenomena varying with the state of action, or the degree of excitement, or, indeed, with the modified grades in which the different elements of this pathological state present themselves. In such cases, the dilated and congested capillaries, the deficient nervous power, and the generally weakened vital manifestations of the frame, require, in their different grades, the accurate recognition and attention of the practitioner. In many cases of truly *asthenic* hæmorrhage, the frequency of the pulse is mistaken for excitement. But, in these, the frequent contractions of the heart are the necessary consequence of the loss of blood, and of the imperfect tonic contraction of the series of circulating vessels upon their contents — are the result of the loss of tension in the vascular circle, and of the facility with which the current is propelled in a relaxed and yielding channel.

13. ii. *Changes in the Structures, the Seats of Hæmorrhage.*—The escape of red blood from the vessels generally takes place upon those surfaces most engaged in exhalation and secretion, and in those structures, which, owing to their natural laxity, furnish a slight support to the capillaries supplying them. Yet extravasation will not take place, as already remarked, during a healthy state of the part, or when its vital cohesion *is* undiminished. It generally supervenes in consequence of certain lesions of the action and organisation of the vascular and capillary systems, or of the tissues which they supply, or of both together. But it should not be overlooked, that a change in the state of the tissues will generally, sooner or later, affect the capillaries supplying them, whilst a lesion of the latter will also affect the state of the former. The question, therefore, chiefly regards the priority of affection, and the extent to which either becomes changed. But it should also be admitted, that the lesion may be coëtaneous and co-ordinate in both the capillaries, and in the tissues the seat of hæmorrhage.

14. Discharges of blood seldom take place to any amount, excepting in textures which furnish, from original conformation, or from diminution of vital cohesion, an insufficient support to the capillary vessels; and which imperfectly enable them to withstand the distending power to which they are subjected, by the occasional increase of the heart's action, and of the momentum of blood passing through them; or by an impeded return of blood through the veins; or by general or local plethora. This important pathological fact is

demonstrated by the occurrence of hæmorrhages as a consequence of softening of the mucous surfaces, or of cellular and parenchymatous structures, or of serous membranes; particularly when their vital cohesion has been diminished by constitutional disease, and when the impulse or action of the heart and arteries has been increased by any external or internal cause. The sanguineous discharges occurring in dysentery, scurvy, purpura hæmorrhagica, fever, &c., are familiar instances of the influence of deficient cohesion of the tissues in the production of hæmorrhage; and epistaxis, hæmoptysis, hæmorrhoids, &c., illustrate a combination of this state with increased vascular action, in which both the heart and arteries participate.

15. iii. *Of Changes in the circulating Organs and Vessels in the Production of Hæmorrhage.* — As to the state of the capillaries in hæmorrhage, it is unnecessary to advance much beyond what I have already stated (§ 13.), because their conditions are very intimately associated with the states of nervous power and of vascular action characterising the attack. In all the more idiopathic hæmorrhages, the vessels cannot be said to undergo any rupture. Their minuter ramifications and extremities seem to be dilated, and their pores, whether lateral or terminal, so far enlarged by the deficient tone and cohesion of their parietes, and of the tissues in which they terminate, as to admit of the exudation of a large portion of the blood flowing through them. This state of the capillaries in the seat of hæmorrhage is, however, generally associated with other important changes in the circulation, and in the blood itself. The changes in the circulating organs vary in the different states of hæmorrhage. Those which precede and induce the discharge are generally different from those which accompany it, and ought to be carefully distinguished. They are principally the following: — 1st. Increased action of the heart, and general febrile commotion, as above explained — as in *active*, *sthenic*, or *febrile hæmorrhages.* — 2d. Determination of blood to the seat of hæmorrhage; or active congestion of its capillaries and larger vessels, with symptoms of excited action of the part and its vicinity chiefly — as in *sub-acute* cases. — 3d. Very frequent or very weakened action of the heart, with depressed nervous power, impaired tone of the circulation, and laxity of the soft solids — as in *asthenic*, *passive*, or *non-febrile hæmorrhages.* — 4th. Impeded circulation, and consequent congestion of the venous system, arising from disease of the heart. — 5th. Interrupted circulation through the liver, or impeded return of blood from any viscus or part — as in some *symptomatic hæmorrhages.*

16. The *first*, *second*, and *third* of these states have been sufficiently explained. — In the *first* and *second*, however, the dependence of the hæmorrhage upon inordinate action and hypertrophy of the heart should not be overlooked; effusion of blood within the cranium or into the lungs being occasionally caused by this organic lesion. — The *second* pathological state of the circulating system commonly precedes the discharge, or exists chiefly at its commencement — is frequently the immediate cause of the hæmorrhage and is generally removed by it, as in epistaxis, &c. — In the *fourth* of the above states, the hæmorrhage is entirely owing to the venous congestion or plethora induced by the cardiac disease. Extravasations of blood from this cause, generally assume states intermediate between active and passive. The obstruction to the circulation through some one of the cavities of the heart, extends its influence to the venous capillaries, and these also become congested. The action of the heart and arteries being unimpaired, or even increased, by the obstacle to the circulation through the veins, the congestion of the capillaries is thereby augmented, until, at last, their contents partially exude through their parietes or pores in the situations where they are of the greatest tenuity, or are weakest, or the least supported by the structures in which they are distributed. This form of hæmorrhage is analagous to the inflammatory action which occasionally takes place under similar circumstances; and differs from it chiefly in respect of the states of vital cohesion and tone in the vessels and tissues affected, and of the fluids discharged from the diseased parts. Where inflammatory action is the consecutive affection, the organic nervous power of the part, and the tone of the capillaries, have not been overpowered by the congestion or local plethora to which they had been subjected, but re-act upon the causes of distension. When, however, hæmorrhage is the result, we may infer, either that the tonic action of the capillaries has been overcome, and the blood has exuded through them, as just stated; or that the cohesion of the tissue has been so weakened as to deprive the capillaries of the necessary support, and thus to favour their dilatation and the consequent effusion; but it is very probable that this result more frequently arises from the co-existence of both these changes, than from either of them singly. This reasoning equally applies to the hæmorrhages consequent upon obstructed circulation through the liver, or interrupted return of blood through any part of the venous system. A large proportion of cases of hæmatemesis, of intestinal hæmorrhages, of hæmorrhoids, of hæmoptysis, and of extravasations into parenchymatous organs, are caused in part, if not altogether, by this state of the circulation; although debility, vascular plethora, &c. are also often concerned more or less in their production.

17. iv. *Of the States of the Blood in Hæmorrhages.* — Changes in the circulating fluid, as to quantity and crasis, are more concerned in the production of hæmorrhage, than modern writers have admitted. — In the *first* of the pathological states of the circulating system (§ 15. 16.), the blood possesses nearly its natural crasis; and, when vascular excitement is considerable, it often presents similar appearances to those in inflammation, and is not remarkably deficient in fibrine. In this state of the disease, especially, marked evidence of vascular plethora has preceded and ushered in the attack. — In the *second state* of the circulation (§ 15.), the blood may be of natural appearance, or it may participate slightly in the inflammatory or sthenic characters; or its crassamentum may be loose, and either large or small, for the quantity of serum. Its fibrine may be also more or less deficient. In this state, general as well as local plethora usually exists at the commencement of the seizure.

18. In the *third*, or decidedly *asthenic*, pathological condition (§ 15.), the blood is more manifestly altered than in either of the above. It usually does not separate into a firm coagulum. Sometimes no separation into crassamentum and serum takes place; and, if it does so separate, the former is loose, dark, or even black, particularly in its lower part, and readily mixes with the serum, in which it is occasionally sunk, appearing like a black deposit at the bottom of the vessel. In some cases, the blood flows from the part like a dark cruor or sanies, without coagulating, or contributing thereby to the arrest of the discharge: in other instances, it is pale, thin, and watery. The deficiency of fibrine in all these circumstances is very remarkable. In several, the serum is unusually albuminous. In this form, there may be general or partial vascular plethora at the commencement of the attack; but I believe that a state of anæmia is sometimes present, particularly when the blood is pale, thin, and watery; at least, there is an obvious deficiency of fibrine and of red particles. This state of the circulating fluid is sometimes primary; is not infrequently associated with a lax or delicate organisation of the extreme vessels; and evidently contributes to the production of the hæmorrhage: the weak or lax capillaries giving a ready issue to the thin fluid, especially in its state of deficient crasis.

19. Whilst the *first*, *second*, and *third* pathological conditions of the vessels above noticed, — which may be considered as constituting the more idiopathic forms of hæmorrhage—are thus attended with various morbid states of the circulating fluid; some of these states, however, being proper to, or the usual concomitants of, these conditions of the vessels; it should be recollected that each of these conditions insensibly passes into one another, and that each of those morbid appearances of the blood is variously modified and combined; so that hæmorrhagic diseases, in the different forms, states, and complications in which they present themselves to our notice, are occasionally accompanied with every morbid change comprised in the article on the *Pathology of the* Blood. Moreover, the appearance of this fluid varies, at different stages of the same seizure, with the quantity lost, and with the depression of vital power thereby produced; so that when the hæmorrhage has been to a very considerable amount, the proportion of serum becomes relatively much increased, owing to the rapid absorption of fluids into the circulation from the prima via, and different tissues and organs; the density of the coagulum being, at the same time, more or less diminished, and the quantity of fibrine remarkably lessened, as the sthenic passes into asthenic action, until, at last, fibrine can scarcely be detected in the more asthenic or passive forms of the disease.

20. Of the frequency of *plethora*, general or local, as an element of the pathological condition ushering in hæmorrhage, the practitioner should be fully aware; as the removal of this state is intimately connected with the prevention and judicious treatment of the disease. The quantity, as well as distribution, of the blood in the system, the state of organic nervous power, by which local determinations of blood are chiefly produced, the degree of vascular action, and the turgidity of the part affected, vary with the *age* of the patient, with his constitution and temperament, and with the nature of antecedent or associated disorder. It may be stated as a general inference, that hæmorrhages are more referrible to excited action of the heart, to irritation in the seat of discharge, and to a dilated or morbidly erectile state of the capillaries, conjoined with increased action of arterial vessels, and, consequently, that they partake more of an acute, active, or sthenic character, the earlier the age of the patient. On the other hand, they more evidently depend upon obstruction to the venous and capillary circulation; on a softened, relaxed, or diseased state of the structure, in which they occur; and on lesions of the vessels themselves; and, therefore, are more commonly of a passive or asthenic kind, or, at least, present the lower grades of activity, the more advanced the periods of life at which they take place. As to the influence of *age* on the forms of hæmorrhage, my opinions are not very different from those of Stahl, in whose writings may be found much of what has more recently been advanced on the pathology of this class of diseases.

21. v. Remote Causes of Hæmorrhage. — *a. Predisposing causes.* — The frequency of hæmorrhages, especially their more active states, is greater in the sanguineous, the irritable, or the sanguineo-bilious *temperaments*, in plethoric constitutions, and in the scrofulous *diathesis*, than in the nervous, lymphatic, and melancholic temperaments, and in spare habits of body.—They are more common and abundant towards the completion of youth, than at any other period; and they are comparatively rare in infancy and in old age. Females are more subject to them than males. They occur sporadically, and are more frequent in spring than at any other season; but are scarcely ever epidemic; although at Breslaw they prevailed at one time to a remarkable extent,—children having epistaxis, adults hæmoptysis, and the aged hæmorrhoids. There may be said to be a hæmorrhagic *diathesis*; inasmuch as hæmorrhages are more common in the offspring of parents who have experienced attacks, than in others; and as they are often observed in several children or members of the same family. M. Chomel remarks that hæmorrhages from the rectum, urinary organs, and uterus, occur oftener in cold than in warm seasons; and that epistaxis and hæmoptysis takes place more frequently in summer than in winter. I believe that this is the case, especially during dry states of the air. In childhood, hæmorrhage takes place chiefly from the pituitary membrane; in adolescence, from the bronchial surface; and in mature age, from the rectum, the urinary and uterine organs. —Whatever tends to increase the quantity of the circulating fluid, is, so far as it has this effect, a predisposing cause of hæmorrhage; as too much or too little nourishing food, indolence, the suppression or retention of accustomed discharges, the neglect of requisite evacuations, and the loss of a limb.

22. *b.* The *exciting causes* are—sudden increase of temperature; great dryness, and the rapid diminution of the weight, of the atmosphere; the use of alcoholic liquors or of other stimulants; violent mental emotions, especially anger, joy, &c.; too warm clothing, or too warm apartments; muscular exertions, quick walking or running; ascend-

ing heights; and various chemical and mechanical irritants. These causes generally give rise to the more active or *sthenic states* of the disease. Dr. Parr very justly disputes the rarefying influence of heat on the blood in the production of hæmorrhage, and refers the operation of this agent chiefly to the living solids. There can be no doubt of heat not only exciting the nerves, but also causing an expansion of the extreme capillaries and increased fluxion to the parts affected by it.—The usual causes of debility — as insufficient and unwholesome nourishment, the depressing passions, fatigue, contamination of the circulating fluids by impure or close air, poisonous injesta, exhausting secretions, masturbation, &c.—principally occasion *asthenic* hæmorrhages.

23. vi. The Symptoms differ very remarkably according to the situation and circumstances in which hæmorrhage takes place. They vary also with its extent and rapidity — according as it constitutes the principal lesion, or is a contingent and comparatively unimportant phenomenon. When extravasation takes place in the substance of an organ, the functions performed by such organ will be interrupted co-ordinately with its amount and rapidity; but when it occurs into one of the large serous cavities, little interruption of function is observed, until the effusion is so great as either to produce syncope or to embarrass the adjoining organs by pressure. Hæmorrhage from mucous surfaces is generally made manifest by its discharge through the outlets of the canals in which it takes place. Yet, even in these cases, the extravasated blood may be retained, although its quantity is so great as to give rise to the most serious results. The *blood* itself presents all the appearances already described (§ 17. 18.), according to the state of vital power and of vascular action, and the quantity and quality of this fluid. If it be contained long in any cavity or part, it will be coagulated, or grumous, or thick, dark, greenish, brown, or sanious, or otherwise altered, according to the situation, the period of retention, and the state of the patient. When extravasated blood passes through a large portion of the digestive canal, it is still more remarkably changed by admixture with the secretions, gases, and other matters in this situation. Hæmorrhage, as to quantity, varies from a few drops to several pounds.

24. *A.* The *symptoms* preceding and attending hæmorrhage differ so as almost to defy description. — The more active and *sthenic* forms are preceded by signs of general plethora and of increased action; slight horripilations, and a frequent, full, open, and jerking, or bounding pulse, often ushering in the attack. The more *asthenic* states frequently are unpreceded by any distinct premonition, and are unattended by vascular reaction; flaccidity of the soft solids, with a weak, soft, rapid, or expanded pulse generally accompanying the discharge. In the *former*, there is a sense of heat, tension, fulness, and throbbing, with slight or shifting pain, at the commencement, and often actual increase of temperature in and near to the seat of hæmorrhage. In the *latter*, these sensations are rarely felt, and increased temperature is not observed; general uneasiness, with pallor, shrinking, and coldness of the extremities, in various degrees, being common to both.—In the *active* states, the blood is florid, coagulates readily and firmly, and frequently ceases to be discharged as soon as the evacuation has proceeded so far as to remove the plethora, and increased action occasioning it; the patient often feeling lighter and better from the attack. But this is by no means uniformly the case; as the hæmorrhage sometimes proceeds to a dangerous extent, not merely as respects the organ affected, but as regards the quantity of blood lost to the œconomy. This arises from the nature of the local lesion associating itself with the hæmorrhage, or from the vital depression caused by the discharge, or from the lost power of the capillaries, or from the difficulty with which local fluxion or determination of blood is arrested, when once established and an outlet given to it, particularly when the coagulating property of the blood is impaired owing to deficiency of fibrine, or from two or more of these causes conjoined.—In the *passive* states, on the contrary, the blood is dark, fluid, thin, or even pale, and incapable of coagulating firmly, or even at all. The powers of life sink still lower as the hæmorrhage proceeds, and become less capable of arresting it, until the relation subsisting between the action of the heart, the tonic contraction of the arteries upon their contents, and the quantity of the contents in respect to the power of vital reaction possessed by these vessels, is subverted; and the patient, in consequence of the subversion, experiences successive attacks of syncope, or suddenly expires.

25. In all cases where hæmorrhage proceeds so far as to depress the pulse, or does not stop after the plethora and increased action have been removed by it, and still more remarkably in the asthenic forms, pallor of the countenance and general surface, coldness of the extremities, a shrunk or empty state of the cutaneous veins, faintness or full syncope on assuming the sitting posture, are present, in a degree usually coordinate with the extent to which the discharge has proceeded.

26. *B.* The *Duration* of hæmorrhage is extremely various. It may only continue a few seconds, or many hours, or even days. It may persist with slight intermissions for months or even years. It may be continued, or remittent, or intermittent. When this last, it may be either irregular or periodic.

27. vii. The Diagnosis of hæmorrhage requires but little remark, as the subject is more fully noticed hereafter. —In cases of very sudden and copious internal hæmorrhage, causing syncope or sudden death, these results may be mistaken for the more common forms of syncope, or for death from apoplexy or from disease of the heart. But the remarkable pallor of the lips, tongue, gums, and general surface; the smallness and emptiness of the jugular and superficial veins; the circumstance of the veins not filling beyond where pressure is made; and the history of the case previously to, and at the time of, either of these occurrences taking place, will point out the nature of the disease, even although no external discharge of blood be observed.

28. viii. The Prognosis entirely depends upon the situation and form of the hæmorrhage.—It is extremely unfavourable when it takes place into the structure of an organ. It is equally so, when it occurs into serous cavities. When it proceeds from mucous surfaces, the danger is generally very much less: it is, however, great, when it is symptomatic of structural disease of the vessels, or of any part of the circulating system, or

of tubercular formations, and when it unequivocally presents asthenic characters. The prognosis is the most favourable, when the hæmorrhage is primary or idiopathic; when it arises chiefly from plethora and excited vascular action; and when it is seated in mucous canals. The nearer to the outlets of these canals it takes place, the less is the risk from it.—Epistaxis and hæmorrhoids are unattended by any danger, unless in cachectic habits, or when there is serious associated disease of related parts; or when protracted, asthenic, or uncontrolled by treatment. But the prognosis must be formed from the states in which individual forms of hæmorrhage present themselves in practice.

29. ix. Division of Hæmorrhages.—Discharges of blood have been divided, in modern times, into certain forms or states indicative of the circumstances in which they take place. Their separation into *active* and *passive* has been very generally adopted since the days of Stahl, who first employed this division; and these terms, or their correlatives, *Sthenic* and *Asthenic*, have been retained for the purpose of expressing the states of vital power and of vascular action upon which hæmorrhages principally depend, in their more idiopathic states. They have likewise been very generally divided into *Idiopathic*, *Traumatic*, and *Symptomatic*,—an arrangement to which, as well as to the former, attention should be paid both in pathology and in practice; and which has been very generally followed, even when the terms *primary*, *essential*, and *spontaneous* have been adopted with reference to the first of these; and *secondary*, *consecutive*, or *sympathetic*, to the third. —Hæmorrhages have also been classed into *Constitutional*, *Accidental*, and *Critical*. Willis arranged them into *critical*, and *morbid* or *non-critical*; Darwin, into *arterial* and *venous*; and Bichat, into those proceeding *from rupture*, and those *from exhalation*. A much more elaborate arrangement has been proposed by Lordat. He divides hæmorrhages into — 1st, Those proceeding from a *general fluxion*; — 2d, from *expansion*; — 3d, from *local fluxion*; — 4th, from *adynamia*; — 5th, from *loss of resistance* in the part; — 6th, from *expression*; — 7th, from *wounds*; — 8th, from *sympathy*. MM. Pinel and Bricheteau have proposed a division of this class of diseases into — 1st, *Constitutional*; — 2d, *Accidental*; — 3d, *Vicarious*; — 4th, *Critical*; —and, 5th, *Symptomatic*. M. Chomel has arranged them into—*α, active*,—*β, passive*,—*γ, constitutional*, and —*δ, accidental*. Dr. Carswell has classed them as follows: — i. *Hæmorrhage from Physical Lesions.* — *A*. From solutions of continuity — *a*. Incised wounds; — *b*. Puncture; — *c*. Laceration; — *d*. Ulceration; — *e*. Mortification: — *B*. From mechanical obstacles to the circulation — *a*. Situated in the heart; — *b*. In the blood-vessels.— ii. *Hæmorrhage from Vital Lesions.* — *A*. From a modification of the functions of the capillaries — *a*. In vicarious hæmorrhage; — *b*. In hæmorrhage from erectile tissue: — *B*. From a diseased state of the blood — *a*. In scorbutus; — *b*. In some forms of purpura; — *c*. In some forms of typhoid fever: — *C*. From debility — in depending parts of the body. — The chief objection to this ingenious arrangement is the neglect of the states of vital power and of vascular action more or less characteristic of the primary forms of hæmorrhage.

30. The following classification will be found to comprise all those states of hæmorrhage which fall within the province of the physician, and respecting which a full inquiry has been instituted above.

i. Hæmorrhage from Physical Causes: — *A. From sudden diminution of the weight of the atmosphere;* support being thus removed from extreme vessels and from yielding tissues, &c., whilst the impulse, or *vis a tergo*, is undiminished: — *B. From incision, puncture*, or *laceration of a vessel or vessels.*

ii. Hæmorrhage from Lesions of Vital Power and Action: — *A. From excited action chiefly* — *a*. Of the vascular system generally; — *b*. Of the vessels in the seat of hæmorrhage principally, or from local determination: *B. From plethora* — *a*. Associated with general excited action; — *b*. With local action or determination; — *These constitute active or sthenic hæmorrhage*: — *C. From debility chiefly* — hæmorrhage taking place in depending or relaxed parts: — *D. From deterioration of the blood* — *a*. Conjoined with debility and impaired action; — *b*. With excited action and exhausted vital power — as in certain states of fever, &c. — *These constitute passive or asthenic hæmorrhage.*

iii. Hæmorrhage from Interrupted Circulation: — *A. Through the heart;* — *B. Through the portal vessels.* — *C*. Through other venous trunks. — In all these venous and capillary congestion precedes, and chiefly causes, the discharge.

iv. Hæmorrhage from Organic Lesions: — *A. From alterations of the vessels themselves.* — *a*. From inflammation, softening, rupture, &c. of their coats; — *b*. From ossific, or other morbid formations in their tunics: —*B. From lesions of the tissues the seats of hæmorrhage*—*a*. From softening of the tissue; — *b*. From ulceration; — *c*. From tubercular formations, &c.; — *d*. From mortification. — The *first* and *second* of these orders comprise these forms of hæmorrhage which are usually denominated *primary*, *idiopathic*, or *essential*; the *third* and *fourth*, those which are commonly called, *secondary*, *consecutive*, or *symptomatic*.

31. x. Treatment. — The treatment must have strict reference to the morbid conditions on which hæmorrhage depends, and according to which I have attempted to arrange the forms and states of the disease. In the observations, however, about to be offered, I shall allude merely to those varieties which chiefly require medicinal aid, and pass over those demanding the active interference of the surgeon.

32. *A. Hæmorrhage from physical causes*, particularly from puncture, incision, and laceration, seldom falls within the province of the physician; but when it does, as when occurring in any of the internal viscera, the principles which should guide him in other cases ought to direct him in this: inordinate action should be restrained, in order to diminish the effusion and to prevent its recurrence; and extremely depressed power cautiously restored, especially when life is thereby threatened, or when the system is incapable of producing coagulable lymph, by means of which a firm coagulum may be formed, and further hæmorrhage be thus prevented.

33. When the hæmorrhage is caused by the sudden diminution of atmospheric pressure, the propriety of having recourse to bloodletting, unless vascular action be manifestly increased, is

questionable. The removal of the cause, when the hæmorrhage is urgent, should alone be confided in. In slighter cases, the sanguineous discharge generally disappears soon after the vascular system has accommodated itself to the novel circumstances in which it is placed.

34. *B. Hæmorrhages from changes in vital power and vascular action* interest chiefly the physician, and require the utmost pathological discrimination and practical decision. Upon the opinion that will be formed as to the degrees of augmented action, or of diminished power, or of vascular repletion, or of asthenia, not only will the success of the treatment, but also the life of the patient, depend. And amongst the most difficult of the many difficult topics with which the practical physician will have to concern himself, none is more difficult or more important than to discriminate the pathological conditions just mentioned.

35. *a. Hæmorrhage depending upon, or connected with, excited vascular action*, generally requires an antiphlogistic treatment; but with strict reference to the degree of action and of organic nervous power, and to the quantity of blood which has been lost. Of these states the practitioner should be capable of forming a correct estimate, and of directing remedies appropriate to them with a decision commensurate with the urgency of the case.—When the discharge takes place from vital organs, he ought not to confide in a single remedy only, however energetic or appropriate; nor even in a succession of remedies; but should so combine his means as that the one may promote the operation of the others.—*a*, When the action of the heart and vascular system is increased, especially if the patient be young, plethoric, or robust, *bloodletting*, general, local, or both; and internal and external *refrigerants*, conjoined with *sedatives* and *astringents*, are indispensable. But the practitioner should be careful in discriminating between the broad, open, quick, and irritable pulse frequently attendant upon hæmorrhage with deficient vital power, or upon the reaction following large losses of blood, and the full, hard, and jerking pulse more commonly observed at the commencement of sthenic hæmorrhage. I have already shown, in the article Blood (§ 58.), that copious losses of this fluid, especially when productive of vital depression or syncope, are generally followed by more or less of reaction. This reaction should be prevented from wholly supervening, or from reaching an inordinate pitch, lest it reproduce the hæmorrhage, and thereby endanger the life of the patient. When it occurs after large hæmorrhages, we should carefully determine, from the tone and character of the pulse, from its softness or compressibility, or action under the pressure of the finger, the degree of tone or vital power attending it. By thus endeavouring to estimate the exact state of the vascular action, attendant, as well as consequent, upon hæmorrhage, the conclusions, which will be arrived at, will suggest the most efficient means of cure.—In cases where the excited action has been preceded by a large loss of blood, we shall in vain attempt to restrain it by further depletion; for it will be generally found that, however excited the action, or frequent the pulsation, vital power is extremely depressed; and that a further depletion will only render the heart's action more frequent, and the pulse more irritable. It is in such circumstances, especially, that a decided but judicious use of sedatives, refrigerants, and astringents, such as will be hereafter noticed, should be resorted to.

36. In cases unattended by general vascular excitement, or in those characterised chiefly by local determination, vascular action being manifestly concentrated, more or less, towards the seat of hæmorrhage, and proportionately diminished in other places, a principal part of the treatment should be calculated to derive the blood from the organ affected, and to equalise the circulation. In such cases, *cupping*, warm *pediluvia*, and, when vital power is much depressed, and the further loss of blood cannot be afforded, *dry cupping*, should not be neglected. This last means I have found of great benefit when extensively or repeatedly resorted to.

37. In general, leeches are not appropriate means of depletion in hæmorrhages, although they may be of service in removing the local congestions or inflammatory irritation sometimes consequent upon them. Cupping should be preferred when local depletion is required; and in most instances in which bloodletting is indicated, even in a small quantity, venæsection will be the preferable mode of performing it. Most of the older writers advised, for the removal of hæmorrhage, venæsection in the standing or sitting posture, and with a large orifice, with the intention of speedily producing syncope; believing that a coagulum would be more likely to form at the orifices of the bleeding vessels during this state. If the hæmorrhage proceeded from one or more large vessels, as in wounds and injuries, the propriety of this practice need not be disputed. But when the blood is merely exuded from the mucous surface, as in most cases of internal hæmorrhage, this practice is of more doubtful efficacy; and, if it were generally adopted, even in young and robust persons, might be injurious, especially if the discharge had been already copious. Besides, the reaction consequent upon full syncope may cause a return of the effusion. It will, therefore, be preferable, in the majority of instances, to carry the depletion no further than to produce slight faintness, avoiding the supervention of full syncope; and to give refrigerants or astringents and anodynes so as to prevent subsequent reaction.

38. *β. Evacuations* by *emetics* and *purgatives* may be either beneficial or prejudicial, according to the peculiarities of the case. But the circumstances indicating or contra-indicating their use, will be made manifest, when I come to consider hæmorrhage with reference to its seats.

39. *γ. Refrigerants* are important agents in the controul of sthenic hæmorrhage, and much discrimination may be shown in the selection of them for particular cases. In general, those which are astringent, and increase the crasis of the blood, should be preferred.—The *mineral acids*, especially the sulphuric, the sulphates, the nitrates, the vegetable acids, particularly the acetic, and the internal and external application of cold, are severally useful in various circumstances.—The most energetic, however, of these, are the *sulphate of alumina* or the *super-sulphate of potash*, given in the compound infusion of roses, and the *super-acetate of lead* with acetic acid; but, in these, the

astringent is equally powerful with the refrigerant action. The *nitrate of potash* and the *muriate of ammonia* are useful refrigerants, but are most beneficial in the circumstances about to be noticed. *Cold*, internally, as iced water or iced lemonade, &c., or externally, in any of the various forms of applying it, is an useful adjuvant of other means; but it should not be employed so as to give rise to reaction, or to favour congestion in the seat of the disease, — consequences which may follow its injudicious use, internally as well as externally.

40. δ. *Astringents*, in active hæmorrhage, are most serviceable, after evacuations have been carried as far as circumstances permit. They should be either conjoined, or alternated, with refrigerants; and occasionally, also, with demulcents and sedatives or anodynes. Any of the individual substances belonging to this class of medicines may be employed according to the urgency of the case; but, with the exception of the spirits of turpentine, the mineral are more energetic than the vegetable astringents. Of the former of these, the *sulphates* of alumina, of zinc, of copper, and of iron, are most frequently employed, either alone, or in vehicles containing diluted sulphuric acid. The tincture of the *muriate of iron* and the *nitrate of silver* are also often used, both externally and internally; but these, and all the vegetable astringents, with the exception just made, are also tonic, and are less serviceable in active than in passive hæmorrhages. In the former, however, they are often useful; and, when given in doses so large as to occasion nausea, they have also a sedative action. The *acetates of lead*, with acetic acid, and the *acetate of zinc*, are, on account of their sedative action, amongst the most appropriate mineral astringents in active hæmorrhage.

41. The spirit of *turpentine* appears to have been employed by the ancients in the treatment of hæmorrhages. It was much used, both internally and externally, during the sixteenth century, but had afterwards fallen into disuse. In the year 1817, I employed it internally in these diseases, and have since continued to prescribe it. (See my *Memoir on the Use of Terebinthinate Remedies in Disease, Lond. Med. and Phys. Journ.* for July and August 1821.) It constringes the capillaries of the part to which it is applied; but, owing to its stimulating action on the nerves, sthenic vascular reaction frequently follows; which, however, soon subsides. When used in large quantity, these effects are proportionately great; and it thereby exerts a powerful derivative influence. When absorbed into the circulation, its astringent effects on the capillaries are also remarkable. Its action varies much with the dose, relatively to the vital energy of the patient. When the dose is large, it reduces the frequency and strength of the heart's action, especially when they are much increased; and hence it is an appropriate remedy in the more active forms of hæmorrhage, inasmuch as, with its constringing action on the capillaries, it weakens the *vis a tergo*. When given in smaller doses, and carried into the blood, it increases the tone, and changes or modifies the action of the extreme vessels. From a very extensive experience of this medicine in hæmorrhagic and other diseases, I may add, that large doses of it should be prescribed with caution, when the powers of life are very much depressed; and that, when a considerable dose of it has been given in such cases, it ought to be carried off by stool. The existence of inflammatory action does not contra-indicate its use, as many have supposed from a misconception of its operation; for it lowers vascular excitement, and prevents effusion and the formation of coagulable lymph, especially when taken in sufficiently large or repeated doses. When the powers of life are much impaired, and after copious evacuations of blood, small and frequent doses of it only ought to be given, conjoined with tonics, aromatics, restoratives, &c.

42. ε. *Sedatives* and *Narcotics* are severally beneficial in active hæmorrhages, but chiefly as adjuvants of more energetic means. The most useful sedatives, in this form of the disease, have already been noticed. — *Hydrocyanic acid* and its preparations are sometimes of service, when much irritablity, spasm, or restlessness, attend or follow the hæmorrhagic attack. *Digitalis* is, however, more generally appropriate, inasmuch as it lowers the action of the heart, and increases the tone of the extreme vessels. — *Narcotics*, especially opiates, are frequently serviceable in similar circumstances, but chiefly in combination with astringents and refrigerants. *Opium* may be conjoined with any of the substances comprised in these classes of medicines; or the acetate of morphia may be given with the acetate of lead, or the muriate of morphia with the muriated tincture of iron. Hyoscyamus, conium, the humulus lupulus, colchicum, and other narcotics, have been severally recommended to palliate some of the contingent phenomena of the disease; but they require no further remark.

43. ζ. *Diaphoretics* have been employed with the view of equalising the circulation, or determining it to the surface of the body, especially when coldness of the extremities and skin accompanies the discharge. But the cooling diaphoretics should only be prescribed—as the nitrate of potash with the sweet spirit of nitre, and the solution of the acetate of ammonia with an excess of acetic acid. In order to derive to the surface, and to equalise the circulation, external derivatives, rather than stimulating diaphoretics, ought to be employed.— The derivatives most to be confided in, in these cases, especially when the hæmorrhage is copious, are the hot turpentine epithem or embrocation, or sinapisms; but the former is much more quick and efficient in its operation, than the latter.

44. η. *Demulcents*, especially the gums, were formerly much employed in hæmorrhage; but are now seldom used, unless as vehicles or adjuncts of more active substances. They are, however, of service in several forms of hæmorrhage, especially where it is desirable to diminish irritation in mucous passages or canals. Powdered gum, when applied to a bleeding vessel or surface, will sometimes arrest the discharge by promoting the coagulation of the blood.

45. *b. Hæmorrhages depending upon asthenia, or the more passive states of hæmorrhage noticed above*, should be attacked directly by means of astringents and derivatives.—*a. Bloodletting* is generally inadmissible; and *refrigerants* must be employed with caution, unless their astringent action be very considerable. Even *cold* should be cautiously prescribed. In some cases, the momentary impression of cold, as of iced water sprinkled on the back or on the genitals, is of service; but a prolonged application of it may be

injurious, or even dangerous. The *vegetable astringents*, as possessing more or less of a tonic property, are especially indicated in the asthenic forms of hæmorrhage; and, of these, the *extract of catechu*, *kino*, the preparations of *krameria; tannin* and *powdered galls;* the bark of the root or fruit of the *pomegranate;* the *simarouba* and *cinchona* barks; infusions of *oak bark*, or of the *uva ursi*, or of *roses*, or of the root of *tormentilla*, or *bistorta;* the *vegetable acids*, also, especially the gallic and acetic; *kréosote* conjoined with the latter of these, or with some other vegetable astringent; the *ergot of rye;* the *terebinthinates;* the *balsams*, and *camphor*, are severally appropriate; and either of them may be prescribed with other means, according to the circumstances of the case. Of these, the spirit of turpentine, in small and frequent doses, with tonics, restoratives, and aromatics, is most deserving of confidence. The *mineral astringents*, especially those already noticed (§ 40.), and the *tonic mineral salts*, may also be employed.

46. *β*. When hæmorrhage proceeds chiefly from, or is connected with, a *deteriorated state of the circulating fluids*, the *chlorate of potash*, or the *chlorate of lime*, may be prescribed with tonic or astringent infusions; and the nitrate of potash may be added, or taken alone in similar vehicles. The spirit of turpentine may also be given in small and repeated doses, with camphor and aromatics.

47. *γ*. In all the forms of asthenic hæmorrhage, *derivatives*, especially the hot turpentine epithem and sinapisms, are of great benefit.—*Emetics* and *cathartics* are rarely indicated; although morbid secretions and fæcal accumulations ought to be evacuated.—*Diuretics* are of service chiefly as adjuncts of more energetic means.—*Anodynes* are rarely necessary; but digitalis is sometimes useful, conjoined with tonic astringents.—*Opiates* are also occasionally serviceable, in similar combinations.

48. *δ*. In those *intermediate states of hæmorrhage*, in which it is difficult to determine whether the active or the passive conditions predominate, and where there appears to be an irregular distribution of action and vital power, rather than general excitement or depression of either, *derivation* by *dry cupping*, by the warm *turpentine embrocation*, or by *sinapisms*, and the internal use of appropriate *astringents*, are chiefly to be relied on.

49. *c*. Those forms of hæmorrhage which may be denominated *constitutional*, and which partake more of the active than of the passive character, require much discrimination. They are generally dependent chiefly upon absolute or relative plethora; and ought not, therefore, as in many other cases of active plethora, especially when thus associated, to be early or officiously interfered with. This form should, therefore, be promoted when incomplete, or treated by depletions, and moderated or arrested when it becomes very considerable or excessive.—When a constitutional hæmorrhage is abortive or prematurely arrested, sanguineous effusion may take place in the parenchyma of an organ, or in some dangerous situation. In this case, the morbid deviation should be combated by means calculated to restore the hæmorrhage to its former seat, to arrest it in the part consecutively affected, and to prevent the bad consequences likely to ensue in the latter situation.—If the hæmorrhagic deviation—the change in the seat of constitutional hæmorrhage—is favourable, as when epistaxis or hæmorrhoids occur, instead of hæmoptysis or hæmatemesis, the interference of art ought not to be interposed, unless the loss of blood is very considerable or alarming.

50. *d*. When hæmorrhage depends upon *obstructed circulation in the heart, liver, or lungs*, and, consequently, upon venous plethora, the *indications* are—to remove this obstruction as much as possible; to diminish the fulness of the veins; to determine predominant action to external parts; and to impart tone to the surface and capillaries affected. The means by which the *first* of these ends is to be accomplished, are pointed out in the articles on the diseases of the organs just mentioned; and those which will accomplish the other intentions have been already noticed.

51. *e*. In all forms of hæmorrhage, the indications of cure, as well as the individual means, should more or less depend upon the causes, upon the seat, and upon the quantity, of the effusion; and should, moreover, be modified by the symptoms, by the age, and the previous state and habits of the patient. For the hæmorrhages which mainly depend upon organic lesions, the treatment should be directed to the removal of these lesions; but, when the effusion is considerable, or takes place into the substance of an organ, immediate means ought first to be used to arrest it; and these means should be strictly appropriate to the states of vascular action and of vital power, conformably with the principles already developed. It is indispensable to the judicious treatment of hæmorrhage, to ascertain and to remove the remote and immediate causes; and to place the patient in a situation and circumstances favourable to the removal of the attack, as well as to the prevention of its recurrence. Hæmorrhage from the lungs, the stomach, intestines, and urinary organs, as well as into the parenchyma of internal viscera, and into shut cavities, are serious occurrences, and should be immediately arrested. When it proceeds from the nose or anus, it is seldom dangerous, and may be left to itself, unless it become excessive. Whenever the loss of blood, in whatever situation it occurs, is so great as to produce much debility, prompt measures should be employed to arrest it. If syncope takes place in such circumstances, the recumbent posture; the aspersion of cold water, or of a small quantity of eau de Cologne or lavender water, on the face; or aromatic vinegar held at a little distance from the nostrils; will restore the patient. But if the hæmorrhage has been so great as to render these means insufficient, an immediate recourse may be had to the transfusion of blood from a healthy person. When convulsions supervene upon large losses of blood, opium, with camphor or other restoratives, should be prescribed.

52. ii. *Of Regimen and Prophylaxis.*—*a*. In *active hæmorrhage*, the patient should be removed to a cool apartment, and repose of body and mind enjoined. He ought to be so placed as that the seat of effusion is most elevated. The clothes should be taken off or loosened; and every obstacle in the way of external applications removed. — When the hæmorrhage has ceased, the same antiphlogistic regimen as was pursued during its

continuance, should be persisted in for some time; and gradually changed. If the effusion have been slight, and particularly if the pulse continue full or strong, venæsection or cupping should be practised, or even afterwards repeated, in order to prevent a recurrence of the hæmorrhage, or the supervention of congestion or inflammatory action in the part. When the discharge and the treatment have removed both the attack, and the attendant general and local plethora, the practitioner should endeavour to ascertain still further the pathological conditions from which the hæmorrhage proceeded, as well as those which remain after it, and to remove them. He ought also to enjoin the avoidance of whatever may cause plethora, or may determine the circulation to the seat of hæmorrhage, or weaken organic nervous power. If the symptoms indicating the recurrence of hæmorrhage appear, a full venæsection should be practised.

53. The *Diet* ought to be chiefly farinaceous; and ripe acidulous or mucilaginous fruits should be liberally allowed. The drink should be made slightly acid, by vinegar, or any of the mineral or vegetable acids. This diet ought to be continued long after the attack. The strong or rich wines, all malt liquors, and spirits, should be uniformly shunned.

54. *b.* After *passive hæmorrhage*, the system should be strengthened, by means the least likely to cause plethora; by regular and moderate exercise in the open air, near the sea; by sea voyaging or short excursions; and by avoiding whatever is likely to favour congestion of the seat of the former effusion, and to depress the mind.

55. *c.* The *repetition* of hæmorrhage, whether of an active, passive, or intermediate character, ought to be carefully prevented; as two evils result from this circumstance, independently of the danger directly connected with it: if the attacks are slight, they are apt to become habitual or constitutional; and, whether slight or severe, they cause disorganisation of the part affected. When hæmorrhage has become habitual, it should not be prematurely suppressed, without having recourse to vascular depletions in its stead, or instituting some external discharge; and even this latter may not be sufficient.

56. *d.* *Constitutional hæmorrhage*, when it is abundant and debilitating, should be treated, in the intervals, by a spare and cooling diet and regimen. Positions which will favour the flux of blood to the organ affected, or impede the return of it, should be avoided; and direct or indirect excitement or irritation of the part, ought to be removed. Whatever tends to produce plethora, or to weaken nervous power, and vascular tone, should also be shunned. (See art. Crisis, for *Critical Hæmorrhage*; and Arteries and Veins, for *Hæmorrhage Symptomatic of Organic Lesions of these Vessels.*)

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HÆMORRHAGES CONSIDERED WITH RESPECT TO THEIR SEATS.

57. In treating of hæmorrhage, as regards the situations in which it takes place, I shall notice it — First, *In parts which admit of the external discharge of the effused blood*, as from the skin, and from the mucous surfaces; the latter of these comprising the most important of the diseases usually denominated hæmorrhagic. — Second, *In serous or shut cavities, necessarily followed by a greater or less accumulation of the effused blood.* — Third, *In the areolar tissues or parenchyma of the viscera.* — In discussing the particular forms of hæmorrhage according to this arrangement, due reference will be made to the vital conditions and morbid relations upon which hæmorrhages were shown, above, more or less to depend.

II. Hæmorrhage from the Skin. — Syn. *Hæmorrhagia per Cutem; Hæmatidrosis*, Ploucquet; *Sueur de Sang*, Chomel.

58. Defin. — *An exudation of a sanguineous fluid from a part or the whole of the cutaneous surface, most frequently the former, without abrasion of the cuticle.*

59. Hæmorrhage very rarely takes place from the whole of the cutaneous surface; and rarely even from a limited part. The effusion of blood *under* the cuticle, as in scurvy and purpura, &c., is different from the form now being considered, in which it is external to this tissue. — When the hæmorrhage is from the cutaneous surface, generally it assumes the form of a sanguineous sweat or perspiration. The situations to which it is most frequently limited, are — the face or cheeks, the anterior parts of the chest and armpits; the mammæ and mamillæ, the groins, the umbilicus; the palms of the hands and soles of the feet; and the heels, toes, and fingers. It may occur in these situations without any abrasion of the cuticle or change in the skin; but it also sometimes proceeds, both in these and in other parts, from ciactrices, nævi, or other alterations of structure.

60. Hæmorrhage from the cutaneous surface generally has been noticed by Beuerenius, Tulpius, Wepfer, Schenck, Garmannus, Ruysch, Lentin, Stahl, Pezold, and Richter; and a few cases of it are given in the *Ephemerides Academiæ Naturæ Curiosorum*. I never saw an instance of it. My learned and scientific friend, Dr. W. Hutchinson, informed me that, during his residence in the Ukraine, he had a fine Arabian horse, whose sweat, upon most occasions of exertion, was sanguineous; and was nearly pure blood upon great exertion. It was general, and unattended by any other sign of disease. — Hæmorrage from the *face* has been observed by Vogel and Pelisson. It has occurred in rare instances during epileptic convulsions: I saw a case of this kind. Discharges of blood from the *mammæ and nipples* are more frequent, and have been seen by Schenck, Amatus Lusitanus, Marcellus Donatus, Mercklinus, Vander Wiel, Panarolus, Paullini, Bierling, Hoffmann, Schurig, Trioen, Delius, Richter, Wegelin, Jacobson, and myself. Hæmorrhage from the *umbilicus* has occurred chiefly in young children, or during the first weeks or months of infancy. Cases of this kind have been noticed by Fabricius, Shuster, Radford, and others, and have generally terminated fatally. Mr. Pout has detailed a case which thus terminated, and which was the third in one family. Exudations of blood from the armpits, groins, and extremities, especially the fingers and toes, have been remarked by Wepfer, Zacutus Lusitanus, Mercklin, Hagendorn, Ash, Musgrave, Ab-Heers, Riedlin, Bartholinus, Orlovius, Whytt, and Thilenius. Hæmorrhage from cutaneous nævi, and from the cicatrices of ulcers, is not an infrequent occurrence, especially in females in whom the catamenia are suppressed. In this case it assumes the form of vicarious menstruation.

61. i. *Causes.* — Cutaneous hæmorrhages are evidently more or less connected with the state of the constitution and of the circulation. They have been seen at all ages, and more frequently in females than in males. They most commonly appear after the suppression or cessation of accustomed sanguineous or other discharges; more especially the menstrual. When they take place from the breasts, they often recur periodically,

and replace the catamenia. They are sometimes caused by great exertion, by violent emotions, by sudden terror or fright, and by great muscular efforts. MAYER states that he saw a case in which the hæmorrhage returned twice annually, about the equinoxes upon muscular exertion.

62. ii. The *Phenomena* attendant upon cutaneous hæmorrhage have not been closely observed or described. In some cases, where the exudation was partial, pain and redness of the surface preceded it. In others, the blood has issued from a greater or less extent of the skin, in a manner similar to the perspiration, of which it seemed to constitute a part. It has varied in deepness of colour and in fluidity, as well as in quantity. Upon wiping it off, the skin has presented no change of structure, and has continued still to exude the blood from its surface. The discharge has seldom been of long duration, although it has frequently recurred. Where it has been vicarious of menstruation, and has proceeded from the mammæ, or from nævi, or from a cicatrix, increased fulness, redness, and heat of the part has generally preceded it for a short time.

63. iii. The *Prognosis* of cutaneous hæmorrhage is generally favourable, when it is partial unless it be dependent upon internal disease. When it is general, it is not unattended by danger. The soft solids and the blood itself are then generally more or less in fault; and this seems to be not less the case when it has been caused by violent mental shocks or sudden frights.

64. iv. The *Treatment* should altogether depend upon the states of vascular action and vital power; and ought to be conducted according to the principles developed above. If the hæmorrhage has followed the suppression of an accustomed discharge, the restoration of this latter ought to be attempted. If it has proceeded from fright or moral emotions, antispasmodics, restoratives, and sedatives should be administered. If it be evidently passive, and very abundant, it ought to be moderated or restrained by tonic astringents, internally and externally prescribed.

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III. HÆMORRHAGE FROM THE NOSE.

— SYN. Ἐπισταξις (from ἐπισταζω, I flow drop by drop); Αἱμοῤῥαγία, Hippocrates; *Hæmorrhagia*, Linnæus, Sagar, Sauvages; *Hæmorrhagia narinea*, Hoffmann; *Epistaxis*, Vogel, &c.; *Hæmorrhagia Narium*, *Sanguinis Stillatio, vel Stillicidium è Naribus*, Auct. var.; *Hémorrhagie nasale*, *Saignement du Nez*, Fr.; *Nasenblütfluss*, Germ.; *Bleeding from the Nose.*

65. DEFIN. — *The effusion of blood externally from the pituitary membrane.*

66. There is no part of the body more disposed to hæmorrhage, than the pituitary membrane; and none in which the recurrence of the discharge is productive of so little injury, as respects either this structure or the constitution. It is necessary to a due consideration of the pathological and therapeutical relations of epistaxis, to recollect, that this membrane is supplied by the external and internal branches of the common carotid arteries; and that its blood is returned partly into the external jugular veins, and partially, by anastomosing branches of veins, into the anterior veins and sinuses of the cranium. The blood effused from the pituitary membrane may be discharged either by the nostrils, or by the mouth after having passed into the posterior fauces. This latter very generally occurs when the patient is in a supine posture; it then not infrequently flows into the pharynx, and is swallowed. If the quantity of blood is great, which thus passes into the stomach, irritation of this organ, and of the intestinal canal, sometimes followed by vomiting of the blood — by a pseudo-hæmatemesis — or by melæna, not infrequently supervenes. On the other hand, blood may be discharged through the nostrils, without having been effused by the pituitary membrane. This occurs when a sudden or profuse hæmorrhage takes place from the pharynx, bronchi, or stomach; but it is not, and therefore should not be confounded with, epistaxis.

67. i. The *Phenomena of Epistaxis* are well known; but the signs of its occurrence, and the true pathological states ushering it in, are not so generally recognised or justly estimated. — *A.* The *precursory symptoms* vary much according to the grades of vital action, of local determination, and of general or local vascular fulness, preceding and attending it; and upon these pathological conditions entirely depend the hypersthenic, sthenic, or asthenic, — the entonic, or atonic, — the active or passive character of the hæmorrhage. In proportion as it partakes of a hypersthenic or sthenic form, the more manifestly will it be ushered in by one or more of the following symptoms; — by pain of the head or face; by vertigo, stupor, or somnolency; by frightful dreams, or restlessness; by redness or heat of one or both cheeks; injection of the eyes or lachrymation; by flashes of light before the eyes, or affections of the sight; deafness, or noises in the ears; increased strength of pulsation in the temporal or carotid arteries, and fulness of the veins; and by a sense of fulness,

tension, dryness, heat, or of titillation or itching of the nostrils. Not infrequently, especially in the more passive or asthenic states, the hæmorrhage occurs without any premonition, or merely after a slight touch or local irritation. The character of the pulse varies with the degree of vascular action and of vital power; and in proportion to the grades of both it is full, strong, and rebounding. According, also, as both action and power are weakened, the pulse becomes frequent, soft, compressible, open, small, and undulating. The older writers considered that a dicrotic or rebounding pulse indicated the occurrence of this, or of some other hæmorrhage; but no great dependence can be placed upon this symptom.

68. *B.* The hæmorrhage may take place from one or both nostrils; but in the latter case it is greater from one than the other. The quantity of blood discharged may vary from a few drops to many pounds; and, in the more obstinate passive states, the patient may be reduced to the utmost danger, or may be carried off in a few hours, or days, according to the continuance or violence of the discharge. In some cases, a fibrinous and more or less firm coagulum attaches itself to the part whence the hæmorrhage proceeds, and occasionally hangs out of the nostrils over the upper lip, or down into the posterior fauces. As long as this remains attached, the discharge continues suppressed; but when removed prematurely or otherwise, it returns, even with increased violence and danger. The disease may be *continued*, *remittent*, and recurrent, or *intermittent*. In this last case it may return irregularly or *periodically*.

69. *C.* The more active or simply *sthenic* epistaxis is often *symptomatic* or *critical* of several acute diseases, attended by increased action; especially the more inflammatory kinds of fever, and inflammations of the brain, or of the lungs, &c.—The *passive forms* are frequently *symptomatic* of several cachectic maladies; and of the last stages of malignant or low fevers.—Many writers, even as recent as the Franks, suppose that, in cases of epistaxis consequent upon enlargements or *obstructions of the liver*, or of the *spleen*, the hæmorrhage is generally upon the same side as the enlarged viscus.

70. ii. Causes. — *A.* Epistaxis occurs most frequently in children and young persons, especially in its more idiopathic states. It affects most commonly the sanguine, irritable, the plethoric, and florid; and those possessed of great talents, of delicate or relaxed fibres, of weak constitutional powers, and of much sensibility. After ten or twelve years of age, it is oftener observed in the male than female sex. It is not infrequent in males about the change to the decline of life; and then, as well as at later periods, often prevents more serious hæmorrhagic or inflammatory attacks. Epistaxis is also often dependent upon peculiarity of constitution or diathesis, and is consequently, often hereditary, or observed in several of the descendants of the same parents, or members of the same family.—At advanced ages, it is most common in those who live luxuriously and partake largely of wine or malt liquors. In the more mature periods of life, it is most frequently *symptomatic*, or dependent upon disease of the heart, of the liver, spleen, or of some other viscus; or consequent upon the disappearance of some sanguineous or other evacuation.

71. *B.* The *exciting causes* are extremely numerous and diversified; for whatever favours an increased flux of blood to the head, and to the pituitary membrane; or retards the return of this fluid from these parts; or occasions general plethora; or weakens the vital cohesion of this membrane, or the tone of the vessels ramified in it, may occasion hæmorrhage from it, when the predisposition already exists. — *a.* The *external causes* are — injuries; irritants or excitants inhaled into the nostrils; stimulating vapours or gases; fractures of adjoining parts; exposure of the face to fires or furnaces, or of the head to the sun's rays, either uncovered, or with a black or metallic hat or cap. — *b.* The *internal causes* are — whatever increases the flow of blood to the head, as anger, shame, or other states of mental excitement or mental disorder; protracted study, and great exertions of the mind; stooping, or a low or depending position of the head; frequent sneezing; catarrh; febrile, inflammatory, and exanthematous diseases; headachs, and rheumatic affections of the face; — whatever retards the return of blood, as deep sighs, exertions of the voice, laughing, singing, crying, &c.; playing on wind instruments; severe cough or difficulty of breathing; sudden terror; disease of the heart or adjoining large vessels; tumours pressing upon the jugular veins, or other causes of obstruction to the circulation in them, or in the subclavians; congestion of the lungs; neckcloths or collars worn too tightly around the neck, &c; —whatever causes absolute or relative plethora, as too full living, the ingurgitation of large quantities of wine, or other exciting liquors; the suppression of accustomed evacuations, especially the catamenial and hæmorrhoidal, &c.; — whatever interferes with the equal distribution of the blood, as wearing tight clothes or corsets, obstructions in any of the large viscera, the gravid uterus, excessive distension of the stomach or bowels, or enlargement of the spleen, epileptic or convulsive seizures, cold applied to the extremities, suppression or retention of the natural discharges, and unnatural positions of the body; — whatever weakens the tone of the vessels in the pituitary membrane, and diminishes the crasis of the blood, as the advanced states of low fevers, scurvy, and other cachectic maladies, frequent returns of the complaint, &c; — whatever determines the blood to the superficial parts of the body, as diminished pressure of the air, high range of atmospheric heat, &c. The epidemic prevalence of epistaxis (which is of very rare occurrence) may be attributed to this last cause. (See Morgagni, *Epist.* xiv. ch. 25.)

72. *c.* The blood is chiefly exuded from the capillaries of the pituitary membrane, as in hæmorrhages from other mucous surfaces: but the question frequently agitated, as to whether it proceeds from arterial or venous capillaries can hardly be solved; nor does it deserve the trouble of inquiry. J. P. Frank observes, that he has frequently seen a varicose state of the veins after cases of chronic epistaxis. The more important considerations as to the pathology of the disease, are those which relate — 1st, to the states of vascular action, and vital tone attendant upon it; — 2d, to the constitution and habit of body of the patient; — 3d, to previous attacks of hæmorrhage, either from the nose or from other parts; — 4th, to antecedent and associated disorders, or to ten-

dencies to be affected by dangerous maladies, as apoplexy, palsy, hæmoptysis, phthysis, &c.; — 5th, to the causes, predisposing and exciting; — 6th, to the probable consequences of an immediate arrest, or of a continuance, of the discharge; — and, 7th, to its critical influence.

73. iii. The PROGNOSIS should have more or less reference to the circumstances just enumerated. It is generally favourable, when the disease occurs in children, or persons about the age of puberty, who are otherwise healthy; but, if epistaxis affect the cachectic, the strumous, those who have evinced a tendency to affections of the lungs, or of the glandular and lymphatic system, or those labouring under disease of the heart, lungs, or spleen, or who are aged, the prognosis ought to be more guarded, inasmuch as the hæmorrhage may be difficult to restrain; or, when arrested, it may return; or may be followed by still more serious results, as by hæmoptysis, or by an aggravation of the associated malady, or by fatal syncope upon using exertion, or assuming a sitting posture. The more sthenic the epistaxis, the less the risk from it, unless it be prematurely restrained. But when it is manifestly asthenic, and copious — if the means of cure fail, and if the blood is thin, dark, or does not coagulate — if the powers of life sink, and the skin and lips assume a pale or waxy hue, the prognosis should be unfavourable, in proportion to the prominence of these changes.

74. In persons who have arrived at, or passed, middle age, the above circumstances (§ 72.) and considerations should, especially, have due weight; and even the contingencies of the attack — whether suppressed, or allowed to continue as far as the immediate safety of the patient will warrant — ought to be fully estimated. Where disease of the heart, especially passive dilatation of one or more of its cavities, or attenuation of its structure, or a disposition to apoplexy or palsy, or engorgement of the liver or spleen, exists, an opinion of the immediate or ultimate consequences should be stated with caution.—When slight epistaxis takes place in the plethoric, or in those addicted to indulgences at table, the circumstance ought to be viewed as indicating the danger of the habit, and the probable occurrence hereafter of apoplexy or palsy, if a more spare diet and suitable regimen be not observed. In forming an opinion of the terminations of nasal hæmorrhage, the remote consequences of the continuance or suppression of it upon related organs should be considered, in connection with the causes and the accompanying phenomena. When the epistaxis appears as a salutary evacuation of an overloaded vascular system — when it has been caused by full living or intemperance, or preceded by headachs, noises in the ears, injected eyes, affections of any of the senses, &c.— the prognosis ought to have reference chiefly to the cerebral disease which it has averted; and the indications which it has evinced should not be lost upon the practitioner, nor upon the patient.

75. iv. TREATMENT. — *a.* Upon visiting a patient with epistaxis, the first glance will often enable the practitioner to decide whether or not he ought to arrest it without delay. When the countenance does not at first furnish sufficient grounds for immediate determination, inquiries ought to be made as to the age, constitution, habits, and previous ailments of the patient; the causes which occasioned the attack; the symptoms ushering it in, and attending it; the quantity and appearance of the blood discharged; and the existing indications of internal disease; in order that a safe conclusion may be arrived at as to this and other parts of the treatment. When one or more of the following circumstances appear at all prominent — if the patient be robust or plethoric; if he have lived fully, and drank wine or malt liquors freely or daily; if he have experienced active disease in the head, or attacks of congestion, or determination of blood to this part; and if headach, redness of the eyes or face, increased heat of the scalp, throbbing of the vessels, or a beating noise in the ears, have ushered in the attack, and more especially if they still attend it; the discharge should not be arrested until the vascular system is relieved; and when this is accomplished, the epistaxis will cease of itself. If it should seem to cease prematurely, and particularly if the above symptoms still continue, depletions, purgatives, and an antiphlogistic regimen ought to be prescribed.

76. *b.* When it is desirable to arrest the discharge, the means of cure should be directed with the *intention* — 1st, of deriving the current of circulation from the seat of hæmorrhage; and, 2d, of constringing the capillaries of the pituitary membrane. With these views, the patient ought to be placed in a cool and airy apartment, with the head elevated, or held upright, and the feet plunged in warm water. The neck should be bared, and *cold* fluids aspersed over it and the face, or cold substances applied upon the nape, or upon the forehead. If these fail, evaporating or iced epithems may be placed over the whole of the head, or the cold effusion may be directed to this part, and an active cathartic exhibited. The most appropriate *cathartics* in such cases are calomel with rhubarb or jalap, and the spirits of turpentine with castor oil; but a full dose of the latter may be given in two or three hours after the former has been taken.—*Emetics* have been advised by STOLL; but they ought not to be given early in active epistaxis. They are most serviceable when the attack has been induced by an overloaded stomach.

77. *Bleeding* is required chiefly in the circumstances just alluded to (§ 75.), and in the more sthenic forms of the disease; but it should not be neglected, in these circumstances especially. It may be necessary to repeat it, even oftener than once, and after longer or shorter intervals. The older writers recommended bleeding from the feet; and many modern Continental practitioners order leeches to be applied to the anus or to the vulva, when the epistaxis has arisen from the suppression of the hæmorrhoidal or catamenial discharge. When it has become habitual, or periodic, and especially if it be vicarious of menstruation, the recurrence of the discharge may be anticipated by the application of leeches to the tops of the thighs near the groins; by aloëtic purgatives; by the semicupium or hip-bath; and by the exhibition of emmenagogues, especially borax, with the aloes and myrrh pill. In other circumstances, *cupping* over the nape or mastoid processes is preferable to other modes of vascular depletion. When the quantity of blood discharged is too great to admit of the loss of more, *dry-cupping* in the former situation should not be over-looked. — In the great majority of cases, however, the

sitting posture, with the head held backwards; *cold* applied to the face; or a piece of cold metal placed between the nape of the neck and the clothes; and cooling drinks, especially those with *acids, nitre,* &c.; will be sufficient to arrest the discharge.

78. *c.* When active epistaxis has proceeded so far as to require to be arrested, and has still continued, notwithstanding the foregoing means, the treatment then called for is also appropriate to the *passive* or *atonic states* of the disease. In these circumstances, the chief reliance must be placed upon astringents, applied to the pituitary membrane, and taken internally with tonics; upon pressure made locally; and upon the insufflation of substances into the nostrils, that may promote the coagulation of the effused blood. A solution of the acetate of lead, or of the sulphate or acetate of zinc, or of the sulphate of iron or of copper, or of the sulphate of alumina, or of the vegetable or mineral acids, or of the pyroligneous acid with kréosote, or of any of the numerous vegetable astringents (§ 40. 45.), may be injected into the nostrils; or lint, moistened with either of them, introduced; but whilst astringents are being used locally, the exhibition of them internally should not be neglected. The superacetate of lead, with acetic acid, and small doses of opium, may be given internally; or other astringents may be taken with tonics; or small doses of spirits of turpentine resorted to, in the manner above recommended (§ 41.).

79. Finely levigated astringent powders, especially those of alum and of gall-nuts, may be blown through a quill into the nostrils; or substances of a glutinous nature may be employed in this manner, particularly powdered gums, as tragacanth or acacia; or astringents may be conjoined with these. Finely powdered charcoal may be employed in the same way. Pungent or irritating substances are often of less service than the powdered gums, which will, without exciting the Schneiderian membrane, favour the coagulation of the blood on its surface. Plugging the nostrils with lint moistened with some astringent solution, is sometimes successful; but when the hæmorrhage proceeds from the more posterior parts of the nares, it will fail, unless the lint be pushed so far backwards as to reach nearly to the pharynx. Care, however, ought to be taken that it does not irritate this part. — J. P. Frank advises a piece of the intestine of a pig, closed at one end, to be introduced into the nostrils, and injected with a cold fluid. — Some writers recommend thick mucilage, others a paste with charcoal or with astringents, and others the white of egg, to be conveyed into the posterior nares, in order to coagulate the effused blood. — When a coagulum has formed, either spontaneously, or by any of the foregoing means, it ought not to be disturbed for three or four days, or even longer, lest the hæmorrhage return.

80. *d.* Besides the above measures, others have been advised. — In order to derive from the seat of hæmorrhage, Zacutus Lusitanus directs the cautery to the lower extremities; Chrestien, warm pediluvia, with mustard flower put into the water; Borelli, bruised nettles to the feet and hands; Niemann blisters to the nape, and Cheza to the arms; Riedlin, the exhibition of active cathartics; and Cælius Aurelianus, cupping on the occiput, Galen on the hypochondrium, and Forestus on the extremities. With the view of constringing the extreme vessels, cold drinks are prescribed by Hoffmann; cold injections through the nostrils, by Morand and Morgagni; the immersion of the head in cold water, by Darwin; cold glysters, by Leuthner and Andriéu; and cold applications to the genitals, by Diemerbroeck, Theden, and Mercier. In addition to the local astringents already noticed, powdered agaric is recommended by Rochard; writing ink, by Riedlin; lemon juice, by Blankard; and spider's web, with vinegar, by Chesneau. The introduction of plugs moistened with spirits of wine is directed by Morgagni and Rath, and with the expressed juice of the common nettle, by Prævotius; and plugs consisting of dough, or chalk-paste, by Avicenna and Diemerbroeck. The injection of a strong solution of isinglass is prescribed by Lentin; and carded lint, drawn or pushed into the posterior nares, is employed by Audouin.

81. The internal use of the acetate of lead, with opium, is advised by Reynolds and Latham; of the phosphoric acid, by Herder; of the aromatic sulphuric acid, by Hufeland; and of the ergot of rye, by Spajrani, Cabini, Ryan, and Negri. — The first of these may be employed in either the active or passive states of the disease; but the phosphoric acid is admissible only in the latter. In passive epistaxis, camphor with opium; the spirits of turpentine, in small and frequent doses, with aromatics and restoratives; the chlorates of potash or of lime; the sulphate of quinine with camphor, &c.; assafœtida with myrrh, and opiates in small quantity (Sydenham), are amongst the most energetic medicines that can be taken internally; but external means ought also to be resorted to.

82. *e.* If epistaxis be vicarious of menstruation, the return of an attack should be prevented only by endeavouring to restore the catamenial discharge. If it be periodic, especially in persons who have suffered from agues, congestion or enlargement of the liver or spleen should be dreaded; and if either be found to exist, deobstruent purgatives, followed by tonics, particularly quinine or the other preparations of cinchona, or Fowler's solution of arsenic, ought to be prescribed; but local depletions should be freely employed previously to these, whenever the liver is the seat of such disorder. When epistaxis occurs in aged persons, either the early suppression of the discharge, or its continuance, may be followed by serious results. It is generally connected with a disordered state of the circulation within the cranium in such cases. What has been stated above will indicate the circumstances in which it will be advisable to interfere; but repeated blistering behind the ears, in some instances cupping in this situation, a seton in the nape, and other measures which the peculiarities of the case will suggest, with a suitable regimen, ought not to be neglected.

83. *f.* If the hæmorrhage from the nares seems to be *critical*, the observations offered in the article Crisis are altogether applicable. When it appears in the last stage of low fevers, or in scurvy, or in purpura, and is merely the consequence of the lost tone of the extreme vessels, with diminished vital cohesion of the mucous surfaces, and a deteriorated state of the blood, the treatment directed for the passive form of epistaxis, or

for putro-adynamic fever, is quite appropriate, if the discharge be so considerable as to require measures to be adopted for it.

84. *g.* The *after-treatment* of epistaxis is often of great importance, especially in persons of middle or advanced age. An attack, whether slight or severe, in those who live fully, ought to be followed by an antiphlogistic regimen. Where the discharge has prematurely ceased, bloodletting should always be prescribed. In order to derive permanent advantage from this treatment, abstinence, regular exercise in the open air, and a due subjection of the mental emotions, ought to be constantly observed. How fatally this may be neglected, is shown by the following case: — A gentleman, aged about 50, of a very full habit of body, accustomed to live richly, and to take his wine freely, but not in excess, became subject to severe headachs. He afterwards had an attack of epistaxis, which continued until the loss of blood was very great, although means were used to arrest it. He recovered, and remained well for many months; yet his usual diet and regimen were persisted in. His headachs, as may have been expected, returned; he became depressed in spirits, and disliked society; but no appropriate treatment was prescribed—or, at most, aperients only were directed. The indications furnished by the epistaxis were entirely lost upon the patient and his medical attendants — abstinence was not adopted by the former, nor precautionary bloodletting by the latter. The consequences may be readily anticipated. He shortly afterwards was struck with apoplexy associated with hemiplegia; for which I was consulted just before his death.—This is, however, not the only instance of the kind which has come before me in practice. I could state the particulars of several cases in which the neglect of the indications afforded by epistaxis, has been followed by apoplexy, palsy, epilepsy, mania, and inflammation of the brain and its membranes.

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IV. Hæmorrhage from the Mouth and Throat.

— Syn. *Hæmorrhagia Oris*, *H. Faucium*, *Stomatorrhagia*, J. P. Frank; *Sanguinis Profluvium ex Ore*, *Hæmorrhoides Oris*, Vogel; *Hæmorrhagie buccale*, Fr.; *Mundblütfluss*, Germ.

85. *A discharge of blood from one or more of the parts forming the mouth and throat.*

86. Hæmorrhage may take place to a great, or even fatal, amount, from the gums, the tongue, the fauces, or the pharynx; and even from the insides of the cheeks and lips. Blood is rarely, however, discharged from one or more of these parts, unless in the advanced stages of cachectic diseases, or of malignant or low fevers. — *a.* Riverius mentions a case in which four or five pounds of blood were discharged from the *lips* every month. Hæmorrhage from this part has been observed also by Zacutus Lusitanus. J. P. Frank met with a case in which it proceeded from varicose veins of the upper lip. I lately saw an instance of varicose veins of this part, but there was no hæmorrhage. Bleeding from the interior surface of the *cheeks* is generally owing to injury from the teeth, or to tumours.

87. *b.* Discharges of blood to a small amount from the *gums* are very common, especially in the advanced stages of the diseases just adverted to; and more abundantly after suppression of accustomed discharges, as the catamenial or hæmorrhoidal. Vicarious menstruation may even take place from this situation. Severe or dangerous hæmorrhages from the alveolar processes have been most frequently caused by the extraction of teeth. Frank has seen several pounds of blood lost from a varicose state of the veins of, and in the vicinity of, the gums: and similar discharges have more frequently taken place from tumours in this situation, and from the excessive use of mercury. Vogel met with an instance in

which the discharge was produced by a combination of mercury and belladonna. Hirsch, Frank, and others, have met with periodic hæmorrhage from this part, vicarious of menstruation. Fatal effusions from the gums have been seen by Horstius, Fabricius Hildanus, and several more recent writers.—The occurrence of hæmorrhage in this situation in purpura hæmorrhagica, scurvy, and the diseases adverted to above (§ 86.), is too well-known to require further notice.

88. *c.* Hæmorrhage from the *tongue* very rarely takes place to any very considerable amount, unless in cases of injury of the raninal veins or arteries, as in dividing the *frænum linguæ*, when it may prove fatal. Slighter injuries from the teeth, especially during epileptic fits, seldom cause more than small discharges of blood. But the more serious diseases to which the tongue is liable (see art. Tongue) may be followed by dangerous or even fatal hæmorrhage. Such instances are recorded by Plater and others. Mari saw 24 lbs. of blood discharged from this part; and J. P. Frank met with a case of *glossitis*, which, upon passing into gangrene, terminated fatally with profuse hæmorrhage.

89. *d.* Hæmorrhage from the *palate* and *fauces* to a very considerable amount has been observed by Bundl, Vogel, Frank, and Kluige. J. P. Frank believes it generally to proceed from a varicose state of the veins in this situation; and hence the appellation, *Hæmorrhoides Oris*, applied to it by Vogel and Bundl. He mentions an instance in a young man, who, for many years, suffered repeated attacks of hæmorrhage from this state of the veins of the palate; and who was permanently cured, after a profuse discharge, by a strong solution of alum. Portal met with a case where the hæmorrhage took place from the *uvula*.—A more or less copious effusion of blood may also proceed from the *velum palati* or *tonsils*, especially in the course of cachectic diseases, or as a consequence of a varicose state of the veins of the part, or of those in the vicinity.

90. *e.* Effusions of blood from the surface of the *pharynx* occur more frequently than is commonly supposed, and are overlooked in consequence of the fluid having passed into the stomach. When the hæmorrhage from this situation is very considerable, the quantity of blood which is swallowed is often so large as to cause vomiting, and to lead to the supposition that the stomach is the seat of the disease. The small veins in the pharynx are not infrequently varicose or obstructed; and when this is the case, hæmorrhage sometimes takes place from comparatively slight causes. The most dangerous discharges from this part occur in the advanced stage of putro-adynamic fevers, and of cynanche maligna, in which the pharynx is more or less affected. J. P. Frank has noticed the occasional supervention of pharyngeal hæmorrhage independently of those diseases: but the subject has been overlooked by other writers. Some years ago, I attended a lady, about 70 years of age, residing at St. John's Wood, who complained of dyspeptic disorder complicated with psoriasis and sore throat. The veins of the pharynx were reticulated and varicose. I was afterwards called to her suddenly on account of a very severe hæmorrhage, attended by vomiting and cough. Much of the blood evidently was brought up from the stomach, but a great part passed directly from the throat. The cough arose from the irritation caused by the fluid on the epiglottis and pharynx. The effusion was arrested for a time by powerful astringents. Two days afterwards, the hæmorrhage returned more violently than before, and terminated life before I reached her. On examination after death, the pharynx was found softened, black, and studded with soft aphthous ulcerations, between which dark blood was infiltrated. The veins of this part were numerous and dilated. The stomach contained a considerable quantity of blood. The upper part of the œsophagus was softened and congested in its internal surface. In this case, the blood had passed into the stomach, the position in bed having favoured this occurrence, and had irritated this organ so as to produce vomiting.

91. i. The Symptoms and Diagnosis of hæmorrhage from the mouth or throat are not always as distinct as may be supposed, particularly as respects the source of the discharge. The symptoms preceding the effusion are very uncertain; and are those most commonly indicating congestion of the head or adjoining parts, or disease in one or other of the above situations. Headach, vertigo, noises in the ears; soreness, irritation, titillation, tension, or a sense of fulness or heat in the throat; a bloated appearance of the countenance, and throbbings of the vessels in the vicinity, sometimes usher in the hæmorrhage. If the patient be in bed when attacked, the irritation of the fluid on the glottis causes *cough*; and the passage of it into the stomach is followed by *vomiting*, when the quantity is considerable, or the stomach irritable. If hæmorrhage take place from the pharynx whilst the patient is asleep, the blood will flow into the stomach; and the first intimation of the occurrence will often be the vomiting of blood. Hence the utmost care is required to distinguish this species of attack from *hæmoptysis* on the one hand, and from *hæmatemesis* on the other, as it may closely simulate either. In order to do this, the mouth ought to be well washed by a slightly astringent and colourless fluid, or the throat gargled, and afterwards carefully examined. If the hæmorrhage be too copious to admit of inspection of the mouth and throat, the patient should lean forwards, so as to allow the blood a free passage from the mouth; and if it flow without coughing or retching, and is neither frothy or very florid, nor very dark or grumous, there can be no doubt as to the situation whence it proceeds. If the patient feel it collect in the throat, and create a disposition to deglutition, or if he require no effort to bring or hawk it up, it manifestly proceeds from the fauces or pharynx.—In many instances, causing the patient to drink some fluid instantly before examining the throat will assist the diagnosis; and in others, the history of the case will be sufficient to settle the question.—When the fauces or pharynx is the seat of the discharge, deglutition of food or drink, or the use of a gargle, either before or during the hæmorrhage, will cause more or less pain. (See *Diagnosis* of Hæmoptysis and Hæmatemesis.)

92. ii. The Causes of stomatorrhagia are those of hæmorrhages generally; but more especially, previous diseases of a cachectic or malignant character; affections of the gums and teeth; repeated attacks of sore throat, particularly when connected

with chronic disorder of the stomach and other digestive organs; the use of mercury; injury or previous lesion of the vessels, especially the veins; and obstructed discharges, as the catamenial or hæmorrhoidal, of either of which, the hæmorrhage from the mouth may be vicarious.—The acro-narcotic poisons may even cause it. In a case of poisoning by aconitum, which I saw some years ago, remarkable swelling of the tongue and fauces took place, followed by moderate hæmorrhage from these parts.

93. iii. The PROGNOSIS entirely depends upon the circumstances in which stomatorrhagia occurs — upon the previous state of disease, and upon the quantity of blood lost, and the effect thereby produced upon the constitution. The general principles above stated will also guide the practitioner.

94. iv. The TREATMENT of hæmorrhage from the mouth or throat requires to be materially modified, according to the parts from which the blood is effused, and the causes producing the effusion. Cases rarely occur, in which it is either necessary or proper to have recourse to bloodletting. Purgatives, however, especially those of a stomachic or tonic kind, are often beneficial — more particularly when the disease is connected with disorder of the digestive organs, and with accumulations of morbid matters in the *primæ viæ*. The chief dependence is to be placed in the local and internal use of the more energetic astringents noticed above — as the sulphates, the acetic acid with kréosote, the acetate of lead or of zinc, spirits of turpentine, the chloride of lime, &c. These may be used in gargles — in more or less concentrated solutions — and in various states of combination, as with gums or mucilages. If the hæmorrhage take place from a single vessel, or from a limited extent of surface, the actual or potential cautery is quite appropriate. If it proceed from the alveolar process, powerful styptics, and various mechanical measures, may be resorted to.

95. When hæmorrhage from the mouth depends upon general cachexia, or supervenes in the latter stages of putro-adynamic fever, or of purpura or scurvy, the above means should be aided by the internal use of tonics, conjoined with vegetable or other astringents and antiseptics, as the chlorides, the chlorate of potash, the nitrate of potash, or the muriate of ammonia, &c., and by an appropriate regimen.—If the effusion seems to proceed from the pharynx, the position of the patient should be such as will favour the flow of the blood from the mouth, and prevent it from irritating, or escaping into, the larynx.

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V. HÆMORRHAGE FROM THE RESPIRATORY ORGANS. — SYN. *Hæmoptysis* (from αἷμα, blood, and πτυω, I spit, or πτύσις, a spitting); αἱμοπτυσις? αἱμοπτυῖκος, Galen, Dioscorides; *Sanguinis Sputum*, Celsus; *Emoptoë*, Gordon; *Sputum Cruentum*, *Cruenta Expuitio*, *Sanguinis Fluor*, *Vomitus Pulmonis*, Auct. Lat.; *Emoptoïca Passio*, Gilbert; *Passio hæmoptoïca*, Plater; *Hæmoptoë*, Boerhaave, Vogel, Darwin; *Hæmotismus*, Auct. var.; *Hæmoptysis*, Sauvages, Vogel, Cullen, &c.; *Hæmorrhagia Pulmonum*, *Hæm. bronchica*, *Hæmorrhæa pulmonalis*, Auct. var.; *Pneumonorrhagia*, J. P. et J. Frank; *Blutspeyen*, *Bluthusten*, *Lungenblutfluss*, Germ.; *Crachement de Sang*, *Expectoration de Sang*, Fr.; *Emotisi*, *Emotisea*, *Sputo di Sangue*, Ital.; *Blodspyting*, Dan.; *Pulmonary Hæmorrhage*, *Spitting of Blood*, *Coughing of Blood*.

96. DEFIN.—*After a sense of heat, oppression, or pain in the chest, and titillation in the throat, the rejection of florid, frothy, or pure blood, from the bronchi or lungs, with a hawking or short cough.*

97. *Hæmoptysis* is one of the most frequent varieties of hæmorrhage, owing to—(*a*), the very extensive bronchial and vesicular surface to which the blood is circulated for the purpose of undergoing the requisite changes during respiration; (*b*) to the delicate conformation of the capillaries and mucous membrane of this part; (*c*), to the liability of the lungs to congestions, from impaired organic nervous power, from obstructions of the pulmonary veins and of the circulation through the left side of the heart, and from tubercular or other lesions of the substance of the lungs; (*d*), and to the liability of this organ to derangements of its circulation from hypertrophy and other lesions of the heart, and from alterations of the large vessels. — Of all these morbid causes and connections, tubercular formations in the lungs are the most common, either as a cause of the hæmoptysis, or as associated lesions consequent upon the same antecedent changes in the states of vital power and vascular action, or as both.

98. i. SYMPTOMS, &c. — *A.* The *premonitory signs* of hæmoptysis are — horripilations, passing redness and heat of the face, or flushings of the cheeks, headach, coldness of the extremities, with a collapsed or empty state of the veins of the surface; lassitude, and sense of weight of the limbs; occasionally cramps or spasms of the lower extremities; a feeling of internal warmth, particularly in the chest; pain or tension at the epigastrium or hypochondria; a burning sensation under the sternum, with more or less anxiety, inquietude, constriction, or oppression at the chest, or dyspnœa; a short, dry cough; dyspnœa, or shortness of breath, on slight exertion; a dull pain or soreness under the sternum, between the shoulders, or beneath the clavicles; palpitations; a quick, hurried, or excited pulse, which is sometimes also hard, full, bounding, or oppressed, &c.; flatulence, or borborygmi, costiveness, and pale urine. A few only of these symptoms, or several variously modified, may be present in individual cases; they may exist for a longer or

shorter time before the attack. In some instances, neither cough, nor difficulty of breathing, nor any symptom referrible to the chest, has been complained of; or it has existed in so slight a degree as to escape the observation of the friends of the patient; and yet the most extensive changes had taken place in the lungs, and caused the hæmorrhage. A case of this kind was attended by Mr. Bushell, Dr. Clark, and myself, whilst this article passed through the press. Such instances, however, are not uncommon, as shown by Rhodius, Müller, Wedel, Gramberg, the Franks, Louis, Clark, and others.

99. *B. Progress.*—As the blood rises to the larynx, a sense of titillation is felt in the trachea, or of irritation in the throat, with dyspnœa; and a gurgling or bubbling sensation in the chest or trachea; and the blood is either hawked or coughed up, exciting a sweetish-salt taste. As soon as this occurs, much alarm is sometimes caused, particularly in delicate or nervous persons; and several of the general symptoms, particularly those connected with the action of the heart and pulse, are owing chiefly to this circumstance. When the blood is in considerable quantity, the discharge of it is attended with a feeling of suffocation; the chest is forcibly dilated, a convulsive reaction or cough follows, and this fluid is ejected from both the mouth and nostrils. In some instances, the irritation at the top of the pharynx, and in the fauces, excites retchings; and in others, the blood, as it collects in the pharynx, is instinctively swallowed; and, when it has accumulated in the stomach, causes vomiting; and gives rise to a suspicion, from this circumstance, and from the presence of portions of ingesta, &c. as shown hereafter (§ 118.), that the hæmorrhage is seated in the stomach. Occasionally the blood is brought up without any effort whatever, beyond a strong expiration, which it accompanies in a full stream; and when retching or full vomiting is occasioned in the manner just stated, another and often a greater discharge of blood from the lungs attends it.

100. The quantity thus discharged, varies from a few drops to many pounds. Rhodius (*Obs.* cent. ii. 31.) saw 23 lbs. lost in three hours; Pezold (*Obs. Med.-Chir.* No. 49.) and Zacchiroli (Weigel's *Ital. Biblioth.* b. iii. p. 154.) observed larger quantities during a much longer period. J. Frank (*Prax. Med. &c.* ii. 2. 1. p. 417.) had a patient who lost 192 ounces in twenty-four hours; and a friend of my own experienced nearly as great a discharge in the same time, and afterwards recovered. When the blood is not considerable as to quantity, it is frothy or contains bubbles of air, and is of a florid hue; when it is very abundant, it is fluid, generally more or less florid, but not frothy: it is seldom mixed with muco-puriform matter, unless it be small in quantity, and it then is often semi-coagulated, and of a darker or brownish tint; but, towards the termination of an attack, this appearance is very common.—If the hæmorrhage is very great, extreme faintness, or even full syncope, may come on: but a sense of depression, or sinking, with a quick, sibilous, and short respiration; a small, weak, interrupted voice and speech; and coldness of the extremities; are more commonly complained of. Occasionally, the least exertion of the voice, or of the body, or a fit of coughing, increases or brings back the discharge; but as often it returns without any such cause.

101. In some instances, the attack is followed by great frequency of the pulse, and generally excited vascular action, with heat of skin, thirst, &c.; although the pulse had been perfectly natural before or at the time of seizure. In these, the congestion of the substance of the lungs connected with the production of the hæmoptysis has passed into inflammatory action, in one or several parts of the organ; or rather, the infiltration of a portion of the effused blood through the smaller bronchi has excited inflammation of them, as demonstrated by the sthethoscope and by dissection. In many cases, especially when the hæmorrhage occurs in weak or lax frames, and scrofulous or tubercular state of the lungs, not only the external discharge of the blood, but also its passage along the bronchi into the more depending parts of the organ, and even its infiltration into the substance of the lungs, or its effusion in the distinct form of pulmonary apoplexy, takes place, as I have several times recognised during life, and ascertained afterwards by dissection.

102. An attack of hæmoptysis may be so severe and sudden as to suffocate the patient before a large quantity of blood is lost; or so continued as to destroy life by the loss of this fluid. Only one violent seizure may occur—the patient recovering perfectly, without suffering materially, after the immediate effects have passed off: but this is seldom the case; more or less disease of the lungs, although unapparent to the friends previous to the attack, following rapidly afterwards. In some instances, particularly when tubercles have proceeded to softening, &c. without exciting much disorder, the hæmorrhagic congestion, infiltration, and atonic inflammation of the substance of the lungs, attendant and consequent upon the seizure, soon destroys life. In several instances to which I have been called, the patients had pursued their usual avocations unconscious of ailment, been attacked by hæmoptysis, and died in three or four weeks afterwards in consequence of these associated lesions of the lungs. In the case above alluded to (§ 98.), death took place 26 days after the attack. More frequently the hæmoptysis is followed by pulmonary consumption in a much less rapid form. When the blood is ejected in small quantity, or of a brown colour, or is mixed with a rose-coloured lymph, or mucus, latent inflammation or active congestion most likely will be found to exist in the substance of the lungs; and this inference ought not to be doubted, if febrile symptoms, with cough, be present, or if the blood taken from the arm be buffed.—In a few instances, the lymph effused from the vessels towards the close of the attack, is moulded into the form of several bronchi, and is expectorated in this state; in others, cretaceous or other earthy concretions, consequent on the degeneration, or the partial absorption, of tubercles, or even ossific matters, are brought up with the blood, or soon afterwards; but most frequently, and especially when the hæmorrhage is scanty, or towards its close, or after more than one attack, muco-puriform matter, with or without minute portions of softened tubercular substance, may be detected; and these become more manifest as the blood disappears.

103. Hæmoptysis may recur at irregular, or even at distant, periods; the patient experiencing but little ailment in the intervals, or presenting merely a marked susceptibility to congestion or inflammatory affections of the lungs. When supplemental of suppressed or retained catamenia, or of the disappearance of hæmorrhoids or epistaxis, is sometimes returns periodically. In such cases, the evacuation depends more upon vascular plethora, than upon serious lesion of the substance of the lungs, although this may also exist.—Some instances of a constitutional recurrence of hæmoptysis (§ 49.) have been observed, and yet a far advanced age has been reached.

104. *C. The appearances after death* comprise almost every lesion to which the lungs, heart, and large vessels are liable, but some of them are more immediately connected with hæmoptysis than others. — *Tubercles* are the most common of all these, in one stage or other of their progress, and frequently they are found in every stage even in the same case — either disseminated through the lungs or clustered — in a crude, softened, and ulcerated state — in connection with small or large excavations, — in some instances, the seats of the softened and partially absorbed tubercular matter containing earthy or cretaceous concretions; and, in rarer cases, the parenchyma of the lungs around them presenting a cicatrised or puckered appearance. When hæmoptysis has been very recent, the lungs are frequently more or less congested, and their substance infiltrated with dark blood, both throughout many of the minute bronchi and cells, and in the connecting cellular or parenchymatous tissue, large portions of the organ exhibiting a spleen-like appearance. In some cases, portions of the lungs are more or less obviously inflamed; the inflammatory appearances having been either antecedent to, or consequent upon, the hæmorrhage, most frequently the latter. In rarer instances, blood is effused in the substance of the organ, forming a distinct cavity filled with coagulated blood.

105. Adhesions between the pulmonary and costal or diaphragmatic *pleura*, both old and recent, frequently exist. The bronchial membrane is generally injected, congested, and of a deep or dark red, or purplish or nearly black, either throughout a large extent, or in parts or patches; but the state and colour of this surface vary with the period at which hæmoptysis took place, and the mode in which the disease of the lungs terminated the life of the patient. (See art. Bronchi, § 3—14.) In rarer cases, gangrene of portions of the lungs, or erosion or ulceration of one or more vessels connected with softened tubercles or cavities, is observed. These cavities are generally lined with a more or less thick secreting membrane. In a few instances, osseous deposit has been found in the membrane of the cyst. (See art. Lungs.)

106. Alterations of the large vessels in the chest, and of the heart itself, are occasionally found, especially in the cases of aged persons. The pulmonary veins have been seen diseased, inflamed, or partially obstructed by humours, or morbid depositions, either externally or internally. I found them inflamed, and a large branch partially obstructed by lymph, in one case. A dilated or varicose state of the pulmonary veins has been noticed in connection with hæmoptysis, by Morgagni, Gillibert, Portal, and J. Frank. Lesions of the pulmonary artery have also been met with, especially *rupture* (Matani, *De Aneurism. Præcordior. Morbis*, p. 120.) and aneurismal dilatation (J. Frank, &c.). Mr. Semple has detailed a case, which he considered hæmatemesis, but which was probably hæmoptysis attended with vomiting, owing to the circumstances above pointed out (§ 99.), wherein the left pulmonary artery was obliterated, and the lung was extensively diseased. Aneurisms of some part of the aorta opening into the trachea, bronchi, or lungs, has been oftener observed than these. Cruickshanks found the lymphatics of the lungs turgid with blood, absorbed from the air-cells, in patients who had died of hæmoptysis.

107. Diseases of the heart, particularly such as occasion obstructed circulation through the left cavities, as narrowing of the auriculo-ventricular opening, lesions of the valves, &c., are not infrequently found in connection with hæmoptysis (Wilson, Watson, &c.). Hypertrophy of the ventricles, especially of the right ventricle, has been remarked, in rare instances. Bertin, Bouillaud, and other French writers, attach considerable importance to this lesion as a cause of the hæmorrhage; but I agree with Dr. Watson in considering the alterations which obstruct the passage of blood from the lungs as more frequent causes than this.

108. ii. Causes.— *A.* The *Predisposing Causes* of hæmoptysis comprise most of those already enumerated in connection with *hæmorrhage generally* (§ 21.), and of those which favour the formation of *tubercular consumption.* (See that article.) Those which are more especially concerned in the production of hæmorrhage from the respiratory organs are — Hereditary constitution; the scrofulous and the hæmorrhagic diathesis; sanguineous, irritable, and sanguineo-irritable temperaments; a plethoric habit of body; the period of life between seventeen and thirty-five; tallness of stature; a narrow or deformed chest; curvatures of the spine, rickets, or severe hooping cough in early life; sedentary occupations, especially at the writing-desk or drawing table; a change of modes of life, as from active employments to inactivity; certain trades, as shoe-making and weaving; the spring and summer seasons; sudden or frequent vicissitudes of temperature and weather, especially rapid changes from cold to heat; suppression of accustomed excretions and discharges; and congestions or enlargements of the liver or spleen. M. Louis found hæmoptysis to occur among men nearly in the same proportion at all ages. Galen, Strampin, Goltz, and Louis, consider it to be more frequent in females than males. Frank and Conring entertain a different opinion; the latter remarks, that men are more prone to the disease than females, unless when the catamenia of the latter are suppressed. Louis found it more frequent in females in the proportion of three to two, and that their age was most commonly from 40 to 65. I believe that the predisposition to hæmoptysis is less, or at least not greater, in females than in males, until the period at which menstruation usually ceases; but that, after this period, the frequent occurrence of vascular plethora favours the production of pulmonary hæ-

morrhage. There is no doubt of the influence of premature and excessive venereal indulgences, and more especially of solitary vices of this kind, in favouring the occurrence of this and its allied diseases.

109. *B.* The *Exciting Causes* are chiefly external injury; fracture of the bones of the thorax; wounds of the chest and lungs; falls or concussions on the chest; physical efforts, particularly in lifting or carrying great weights; compression of the thorax by strait-lacing, &c.; running, especially against the wind, and hunting; protracted exercise with the arms, great exertions of the voice, reading aloud, or speaking for a long time; playing on wind instruments; inhaling irritating fumes, as those of acids, &c., or particles of dust, as in various occupations (see art. Arts and Employments, § 40.); foreign bodies fallen or drawn into the trachea and bronchi; cold in any form or mode of application; rarefaction, or great dryness of the atmosphere; the suppression of other sanguineous discharges; anger, and the more violent mental emotions; venereal excesses; terror, frightful dreams, or sudden surprise; severe fits of cough, of laughter, or of sneezing; straining at stool; and changes in the state of the blood. Besides these, many of the lesions just mentioned (§ 104. *et seq.*) act as exciting causes, especially tubercles and their consequences; alterations of the vessels either in the seat of hæmorrhage, or near the centre of circulation; and difficult or impeded passage of blood through the heart, pulmonary vein, or aorta, &c.

110. *C.* The *Seat of hæmorrhage*, in cases of hæmoptysis, has not always been recognised with precision. Previous to the writings of Bichat, the effusion was very generally supposed to proceed from a ruptured or ulcerated vessel, arterial or venous. Subsequently it has been generally referred to exudation from the capillaries of the bronchial membrane. I believe that at present it is too exclusively imputed to this source; and that, although this is much the most common mode of its production, it not infrequently proceeds from an ulcerated or diseased vessel, particularly when the discharge is sudden, very copious, or rapidly fatal. — It has been supposed by some, that the blood is exuded from the general surface of an ulcerated cavity, when this lesion has preceded the discharge. This may possibly be the case in a very few instances; but, when the cavity is the seat of hæmorrhage, one vessel, or a few only, are most likely its source. In most of the cases of hæmorrhage, in connection with cavities in the lungs, that I have seen, the internal surfaces of these cavities, or fistulous ulcers, appeared not in a state indicating that hæmorrhage either had, or could have, taken place from them. The circumstance of the small bronchi being filled with blood, or their membrane being deeply tinged, or even injected or inflamed, is no proof of the discharge having taken place from them, as the blood, when once effused, even as high up as the trachea, will frequently gravitate or pass downwards into the minute air-vessels, especially when the lungs are in a state of disease or of debility, and will discolour, irritate, or even inflame them.*

111. J. P. Frank has endeavoured to establish a variety of hæmoptysis under the denomination of tracheal, from its seat. Admitting the occasional occurrence of hæmorrhage from this situation, it rarely can be distinguished from other states of the disease, even with the aid of percussion and of auscultation; for, as this very able and practical writer has shown with great truth and originality, a considerable portion of the blood effused in this situation passes down into the bronchi, and gives rise to the same phenomena as depend upon the more common forms of the malady. This, however, he concedes. In cases, also, of profuse hæmorrhage from the pharynx or parts adjoining, a portion of the blood may escape into the trachea, descend into the bronchi, and afterwards be coughed up, thereby simulating hæmoptysis. The blood may thus pass into the lungs as well as into the stomach (§ 91. 99.), and may either be coughed up, or both coughed or vomited up, thereby simulating true hæmoptysis; or, if the quantity be great, it may suffocate the patient. Dr. Watson mentions a case which he saw; in which suffocation occurred from the passage of blood into the respiratory passages, from an ulcerated opening into one of the lingual arteries, the bronchi containing a considerable quantity of this fluid. From the foregoing, therefore, it may be inferred, that the blood in true hæmoptysis proceeds from one or other of the following sources: — 1st, From the mucous membrane of the bronchi — *Bronchial Hæmorrhage.* — 2d, From the substance of the lung, constituting the pulmonary apoplexy of Laennec, or, more correctly, *Pulmonary Hæmorrhage.* — 3d, From an ulcerated or tuberculous cavity, one or more vessels having been eroded or ruptured. — 4th, From aneurism of the aorta, or of some other artery.

112. *D. Certain Pathological Relations of Hæmoptysis* have been very generally overlooked by writers on this and other pulmonary diseases. — *a.* The intimate connection, however, existing between it and *tubercles in the lungs* has been very diligently investigated by Louis, Andral, and others. Andral refers to cases of hæmoptysis in which there appeared to be no evidence of the previous existence of tubercles in the lungs. Such cases are rare, and are to be referred chiefly to extreme congestion of the lungs. Instances are certainly not infrequent, of the hæmorrhage occurring in a state of apparent health; but, in many of these, tubercles in an early stage of their existence may have previously been formed, or even have beendetected upon close examination.

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* This, as well as other points connected with hæmoptysis are very justly stated by the elder Frank: — "Si multus, et ex vasis conspicuis, majore cum impetu cruor in bronchium ruit; ex hoc, in alia, vicina, altiora, assurgit; ex istis, per ramos bronchiorum laterales, declives, in subjectam pulmonis affecti, aut etiam in sani, substantiam descendit, ac novo reflexu, sub summæ anxietatis ad præcordia sensu, violenta diaphragmatis actione, sed interdum *sine tussi* manifesta, et per solam quasi expirationem fortiorem, torrentis adinstar, per tracheam, laryngem, per oris, et narium per ostia, tam fluidus ac floridus, quam partim concretus, obscurus, horrendo spectaculo præcipitat. Sub tanto cruoris ad fauces impetu, pars ejus, in pharyngem regurgitans, *vomitum*, ut vidimus, violentum sæpe provocat, cibosque, forsitan ventriculo contentos, novæ sanguinis undæ, per tracheam simul expulsæ, commistos, expellit, ac validum medico, tussis ipsum aliquando per vomitum cruentum excitatæ, non ignaro, quo demum ex cavo sanguis scaturiat, dubitandi argumentum relinquit. Hæc dubia non minus in casu, quo tussis violenta præivit, ac, istius ob impetum, sanguis non modo pulmonum, sed simul narium e vasis expellitur, urgebunt; aut facile pulmo, ob nares cruentas, profluvii insons, cum magno judicii errore, declarabitur." *De Curand. Hom. Morb., &c.* class. v. ord. iii. gen. 3. § 606.

Baillou remarked that profuse hæmorrhage from the lungs is less dangerous than small, and there is much truth in the observation; but Portal went too far in saying, that those who habitually spit blood are rarely phthisical. My own observation is more in accordance with that of Louis, who states that, with the exception of some cases in which hæmoptysis depends upon external injury, or is connected with suddenly suppressed catamenia, it indicates with very great probability the presence of tubercles in the lungs. Dr. James Clark, in his able work, observes that hæmoptysis is occasionally idiopathic, or dependent upon a temporary plethora or congestion of the lungs, especially when it is a consequence of suppressed sanguineous discharges. In tubercular phthisis, congestion of portions of the lungs, or even of the whole of the organ, is not infrequent, and is, in many cases, followed by a more or less copious hæmoptysis. Such congestion may also develope tubercles, or hasten their progress, as well as occasion the effusion of blood. In some instances the discharge will afford relief to all the pulmonary symptoms, especially when the effused blood is entirely thrown off; but, in others, it will accelerate a fatal issue, particularly when a portion of it remains in the bronchi, and irritates them, as shown hereafter (§ 114.).

113. It has been supposed by Andral and others, that hæmoptysis occasionally is a cause of phthisis, the blood effused into the lungs forming a matrix for tubercular deposits. But to produce this effect the effusion must take place in a scrofulous constitution. I agree, however, with Dr. James Clark in considering hæmoptysis rarely to be a cause of phthisis, unless by the debility it induces when very copious, or by the depletion employed to suppress it; or still more probably by the irritation produced by the effused blood in the minute bronchi. It is a frequent symptom during the whole course of phthisis, and may appear at any stage. Louis states that it was present in some degree or other in two-thirds of his cases. It is rare in the phthisis of children and old persons, and occurs generally towards the close of the disease.

114. *b.* The connection between hæmoptysis and *inflammation of the lungs*, has been very generally overlooked. The former occurs in very rare cases as a termination or crisis of the latter; but when the inflammation is associated with tubercles, the development of these is frequently promoted by the hæmoptysis. One of the most common consequences of hæmorrhage into the bronchi is inflammatory action. The effused blood irritates the mucous membrane of the bronchi, especially in the minuter ramifications, and the morbid action often extends to the air-cells and substance of the lungs. This is very frequently observed in weak and susceptible constitutions, and when the effused blood has been imperfectly excreted from the bronchi. The softening and discolouration of the bronchial surface, generally seen in fatal cases of hæmoptysis, arise from this consecutive inflammatory irritation; and the puriform matter sometimes poured into the bronchi, with or without fibrinous concretions, or a coloured lymph, proceeds from the same source. A part, doubtless, of the fibrinous matters arises from the effused fluid; but a part also consists of the lymph given out by the capillaries, which had shortly before discharged blood. — In all cases, therefore, of hæmoptysis, it is not merely the development or accelerated progress of tubercles which is to be dreaded, but also the supervention of circumscribed or diffused *pneumonia*, which may assume any of the forms described in *Inflammation of the* Lungs.

115. *c.* The relation of hæmoptysis with *disease of the heart* has been already alluded to. The momentum caused by hypertrophy of the right ventricle is rarely sufficient to rupture any branch of the pulmonary artery, although it may probably overcome the resistance opposed by the tonicity of the extreme capillaries in the bronchial surface, or in the substance of the lungs. Dr. Watson, who has taken a very sound view of this, as well as of some other subjects connected with hæmoptysis, states that every instance of pulmonary hæmorrhage dependent upon organic disease of the heart which he had observed, coincided with disease on the left side of that organ, mechanically obstructing the return of blood from the lungs. The obstacle has sometimes been placed at the entrance of the aorta, but it has most commonly consisted of narrowing of the left auriculo-ventricular orifice, and a rigid condition of the mitral valve. Facts illustrative of this relation have also been adduced by Dr. Wilson (*Med. Gazette*, vol. vi. p. 25.), and observed by myself. I believe, moreover, that those powerful mental emotions, which affect suddenly the functions of the heart — which seriously disturb its action and favour congestion of its cavities, as terror, fear, anger, grief, &c. sometimes produce hæmoptysis by impeding the return of blood to the right side of this organ.

116. *B. Other complications* beside the above occasionally present themselves in practice; but, in these, hæmoptysis is merely a symptom, arising from some predisposition to pulmonary or hæmorrhagic affections. — *a.* It has been stated that bronchitis and pneumonia often follow hæmoptysis, and the reason has been assigned (§ 114.). But the *complication* of acute or sub-acute *pneumonia* with slighter forms of this disease, has been very generally overlooked, especially by recent writers. Stoll and Broussais, however, have remarked that hæmoptysis sometimes accompanies, or is an accidental symptom of, pneumonia. The remark is just. Care, therefore, should be taken to recognise this state, as well as to distinguish between both diseases; as the use of astringents, on the supposition that the patient is suffering the former affection only, might lead to fatal results. Even with the aid of auscultation, the existence of the pneumonia may not be ascertained, as the auscultatory signs may be ascribed to the infiltration of the bronchi, or of the substance of the lungs, with the effused blood, or to the attendant congestion. The rational symptoms in this case should be carefully weighed; and where there are dyspnœa, cough, oppressed or quick breathing, heat of skin, a hard or full pulse, deep-seated pain in the chest, crepitant rhonchus and bronchial respiration, present, the disease should be viewed as inflammatory, the hæmorrhage being merely a contingent symptom or complication. Even when the hæmoptysis has originated in tubercles, inflammation of one or more lobes of the lungs may also exist, and may implicate not only the substance of the organ,

but also its pleura, giving rise to albuminous exudation, and adhesions to the costal pleura. I have not infrequently found, upon dissection of cases of hæmoptysis, not only tubercles in every stage of their progress and results, but also inflammations of the substance of the lungs, and of the pleura[*], with all the structural consequences, and yet, in some cases, no pain had been felt so severe as would have directed attention to an affection of the pleura.

117. *b.* It is not unusual to see hæmoptysis in the course of severe *hooping cough*, especially when this latter disease affects persons near, or after, the period of puberty. In children the hæmoptysis is generally slight; but in grown-up persons it is often a dangerous or fatal complication of hooping-cough. — *b.* It is occasionally observed as a consequence of *enlargement* or *congestions* of the *liver* and *spleen*; these affections in some measure causing the pulmonary hæmorrhage, by deranging the circulation through the lungs, or heart, or both. In most of such cases the functions of the heart are intermediately disturbed. Where the hæmoptysis is consequent upon hæmorrhoids, obstructions of the liver may be anticipated. This connection has been noticed by Baillou, Morgagni, Stoll, Landré Beauvais, and others. Sauvages makes very particular mention of the occasional dependence of hæmoptysis upon enlargements of the spleen. The connection between hæmoptysis and *hæmorrhoidal affections* is generally one of sequence rather than of association; the former following the latter, or sometimes occurring after operations for these, and for *fistula in ano.* The connection with *amenorrhœa* is generally that of cause and effect; but the pulmonary disease and the attendant hæmorrhage more frequently give rise to the suppression of the catamenia than this latter occasions the hæmoptysis. — *c.* Pulmonary hæmorrhage has also, in rare cases, appeared in gouty persons, or in connection with irregular or misplaced *gout.* In these, calcareous concretions have sometimes been expectorated with the blood, or have been found in the lungs on dissection. — *d.* The symptomatic occurrence of hæmoptysis in the course of *measles*, of *putro-adynamic fevers*, of *scurvy*, *purpura*, and pestilential diseases, requires no remark.

118. iii. Diagnosis. — It will often be difficult to determine whether or not the blood discharged proceeds from the bronchi, or from the nares, throat, pharynx, or stomach, owing to the circumstances insisted upon in other parts of this article (§ 91. 99.). The remarks there made, in illustration of this, render it unnecessary to enter much further into the subject. — *a.* When the blood is florid, frothy, or contains bubbles of air, or is mixed with muco-puriform matters, then all doubt will be removed. The history of the case, and the premonitory and attendant phenomena, are generally such as to remove all difficulty, unless when the patient has been previously in good health, or when the blood is of a dark hue, or when a large portion of it has been swallowed, and is thrown up by vomiting. In these cases, it will very commonly be found upon auscultation that blood is present, either in the large bronchi, causing a bubbling rattle, or in the small ramifications, with loss of the respiratory sounds, and with dulness on percussion Phthisical indications, also, referrible to the constitution, have generally preceded the attack; and symptoms of disorder of the respiratory organs have ushered it in, and accompanied it.

119. *b.* When the accumulation of blood in the *pharynx* from the fauces or adjoining parts excites cough, or escapes into the trachea or bronchi, the difficulty of determining with precision the source of the discharge is generally great. In these the practitioner will be guided chiefly by the state of the patient just before the attack, and by the premonitory symptoms. The absence of disease within the chest, as indicated by auscultation and percussion, an attentive examination of the mouth and throat. and a close observation of the phenomena attending the discharge of blood, will greatly assist the diagnosis (§ 91. 99.).[*]

120. iv. Prognosis. — Hæmoptysis is always a serious disease, and attended by danger in most circumstances. This character, however, does not so much depend upon the hæmorrhage, as upon the pathological state or lesion, of which it is the consequence. The opinion as to the result will, therefore, be chiefly formed from the inference as to its source. Wherever there is any obvious sign of tubercular disease, and when dyspnœa or pulmonary symptoms have preceded the attack, a most unfavourable prognosis should be given. The question merely relates to the period which may elapse from the occurrence of hæmorrhage to a fatal termination; and this will depend much upon the season, upon the progress of the pulmonary lesions, and various other circumstances. — The cause of the disease should also be taken into consideration, and the pathological states which complicate the hæmorrhage. When there is reason to infer that venereal excesses, and more especially solitary venereal vices, have induced the malady, as they very frequently do, we may infer that tubercles have preceded the attack; and should consequently form a most unfavourable prognosis, especially when the diathesis is obviously scrofulous or hæmorrhagic. The circum-

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[*] As the article was going through the press, a boy, aged 15, of a scrophulous diathesis, who had been long under my care with tubercular phthisis, died with profuse hæmorrhage from the lungs. Excavations in this organ, with accretion of the pleura, had been recognised some months before his death. He had not complained of pain in any part of the thorax. The body was examined in my presence by Mr. Herbert Barker, twelve hours after death. Numerous cavities with thick linings were found dispersed through both lungs; the small intervening spaces being studded by crude tubercles. Each lung contained between thirty and forty ulcerated cavities, varying from the size of a bean to that of a large orange; those on the right side being the largest, and from this side the hæmorrhage had taken place. The cavities on the left side were filled by pus of various colour and consistence. Those on the right were filled chiefly by coagulated and fluid blood, the latter mixed with pus in some places. The right pulmonary pleura was so firmly adherent to the costal and diaphragmatic pleuræ, that this lung could not be removed from the chest until all the costal pleura was removed from the parietes to which it was attached. In this case the heart participated, in its unusual atrophy, in the extreme emaciation of the body. The stomach, as in many cases of profuse or fatal hæmorrhage from the lungs, contained a large quantity of blood, thus illustrating the statements made above.

[*] Paulus Ægineta remarks, that if the blood be frothy and light, it comes from the trachea; but if it be black or grumous, and if there is pain in the part, it is from the thorax. If it is brought up by hawking, it is from the palate or parts about the pharynx. If it flow from the head, it is evacuated with tickling and cough, for it runs down into the windpipe, and is again brought up; such discharges being generally preceded by an acrid defluxion, and by headach or heaviness. (l. iii. ch. 31.)

stance of the patient not being alarmed by the attack, but flattering himself with the hopes of recovery, should be taken into account, as recommended as early as Aretæus. The dependence of the effusion upon disease of the heart, especially upon narrowing of the left auriculo-ventricular opening, is perhaps not a much more favourable circumstance than the connection with tubercles.

121. A more favourable, but still a guarded, opinion may be given, when the attack seems dependent upon inflammatory determination to the lungs, or on active congestion, or upon general plethora, when the indications of pulmonary disease, or of constitutional fault, are not present; and when the attack has been produced by external violence, or by mechanical injury. If it have arisen from suppressed catamenia or hæmorrhoids, or in connection with congestion or enlargement of the liver or spleen, a similar opinion may be formed, unless the indications of pulmonary disease are manifest; but when the disappearance of these or of other evacuations are evidently the consequence of the disease in the lungs, and of which the hæmoptysis is merely a part, the prognosis should be as unfavourable as in the circumstance above noticed. When hæmoptysis appears after the operation for fistula, particularly when the fistula has been connected with pulmonary symptoms, as it often is, the result may be surely predicted.

122. In every case of hæmoptysis the opinion should partly depend upon the symptoms immediately preceding the seizure, and upon the frequency and state of the pulse both during and after the discharge, due allowance being made for the alarm caused by the occurrence. If the pulse becomes quick and sharp, the breathing short or oppressed; if symptoms or signs of inflammatory action in the lungs or pleura exist or supervene; if a large portion of the lung cease to be traversed by the air; if the expectoration be puriform, or rusty, or offensive; and especially if a cavity be detected in the lungs, and particles of softened tubercular matter appear in the expectoration, a fatal result should be expected.

123. v. Treatment.—*A.* Aretæus and Paulus Ægineta recommend that the patient be laid upon a couch in a cool place, with the head elevated, and all physical and mental excitement, and talking, or strong respiration, should always be carefully avoided. As to the means of cure, Celsus, Galen, Aëtius, and Alexander, are tolerably agreed. Aretæus, Oribasius, Actuarius, and Nonnus, advise bloodletting in most cases, ligatures on the extremities, and astringents internally and externally. A similar practice is advocated by Celsus, with the addition of cold drinks. Scribonius Largus and Octavius Horatianus direct the chest to be sponged with vinegar. Galen remarks that cooling astringents often have a different effect from that which they are intended to produce; that they occasion determination of blood internally, and congestion of the deep-seated veins; and that he has seen persons with hæmoptysis injured by the application of cold to the chest. He, therefore, does not approve of the indiscriminate recourse to astringents and to cold. Cœlius Aurelianus recommends the application of cold water and vinegar or other astringents to the thorax, and bleeding, general or local, or both, if pain, dyspnœa, or a dry cough be present. He gives, internally, gum with alum, and decoction of poppies, vinegar, and electuaries with opium, frankincense, &c. He decides in favour of the disputed practice of applying ligatures to the extremities. Similar remedies are advised by Paulus, with the addition of austere wine and fruits. Amongst the latter, the pomegranate is particularly mentioned. Marcellus directs nearly the same means, with the exception of ligatures. Dioscorides, Pliny, Galen, Alexander, Paulus, and most of the ancients prescribe the hæmatite, or blood stone, which contains oxide of iron.

124. The Arabian writers supply very little information respecting the treatment of hæmoptysis, beyond what is contained in the works of the Greeks. Avicenna, who is very full upon the subject, approves of the internal exhibition of vinegar, and of anodynes, as mandragora, henbane, and poppy, for the relief of cough. Averrhoes condemns the use of vinegar; but Rhases and Serapion advise the chest to be sponged with it. Mesuë prescribes chalybeate waters for drink, and astringents. Haly-Abbas endeavours to adapt the treatment to the forms of the disease. In the hot (the active) variety, he directs bleeding from a vein, and the repetition of it, if required, purging with mild medicines, and the combination of demulcents with poppy. When the disease arises from a cold cause (passive), he prohibits venesection and prescribes stimulants — as frankincense and myrrh, and, in some cases, tonic astringents — as galls, sumach, alum, &c., with astringents applied to the chest. Alsaharavius approves of bleeding, cold applications to the thorax, opiates and astringents, with a milk diet. Rhases agrees with this practice, but guards against the indiscriminate application of cold to the breast. Mr. Adams, in his interesting remarks (*Trans. of* Paulus Ægineta, p. 412.), states that cold applications to this part are not now generally resorted to; yet a practitioner lately acquired great celebrity for curing hæmoptysis by sponging the chest with vinegar. I have been called to two or three cases, for which cold epithems had been most assiduously employed; but they were injurious, and evidently increased the pulmonary congestion and all the pectoral symptoms. Van Swieten is favourable to the internal and external use of cold water in this disease; but I am confident that sponging with vinegar will be found more serviceable and more generally appropriate than a prolonged application of cold.

125. *B.* From the brief view now exhibited, it will be seen that but little progress has been made in modern times in the treatment of hæmoptysis; and that this progress has reference chiefly to the more appropriate use of the means, which were known to the ancients as well as to the moderns. Much, however, will depend upon the decision with which they are prescribed and carried into effect. Upon seeing a patient attacked by hæmoptysis, the physician will frequently find him alarmed; and the consequences of such alarm may be mistaken for the state of the constitution, or the effects produced by the disease. This and various other circumstances must be taken into consideration, and a determination as to the measures to be adopted, in order to arrest the hæmorrhage, promptly formed.

126. *a.* The clothes should be removed or loosened

from the upper part of the body, and the patient ought to be seated upright in a chair, in order to facilitate the discharge of the blood from the lungs. In a recumbent or even reclining posture, the blood will more readily pass along the bronchi and fill the smaller ramifications, than when the chest is erect, and its movements during respiration unimpeded. If the patient be robust or young, if he have not suffered long from pulmonary disease, and if the hæmorrhage has not been very great, *bloodletting* ought to be immediately performed in the arm from a large orifice, until an impression is made upon the pulse, or faintness ensue. Whilst the blood is flowing, the bared chest may be sprinkled with cold water, or sponged with vinegar; and any astringent the earliest procured, as vinegar slightly diluted, may be taken internally. — The quantity of blood to be abstracted, and the repetition of the operation, must entirely depend upon the effects produced by it, and the judgment of the practitioner; but he will be guided in this by the constitution and state of the patient, by the indications of active congestion, or inflammatory determination, by the continuance and violence of the hæmorrhage, by the antecedent symptoms, and by the information he may obtain as to the causes and pathological relations of the seizure. If the patient be delicate, or enfeebled by previous disease, or if the hæmorrhage has continued so long as to render venesection a hazardous measure, or if bloodletting has been already resorted to, or repeated, *cupping* should be substituted. Where further abstraction of blood, even by cupping, cannot be ventured on, *dry-cupping*, as advised by Hippocrates and most of the ancients, and in modern times, by Horne and Weidemann, ought to be adopted. When the least delay may increase the danger, it may be very efficiently and promptly performed with some common beer glasses, or other similar means, several being applied, either between the shoulders or upon the breast. I have often used dry-cupping, in addition to venesection, with marked advantage; sometimes covering the back and shoulders by the substitutes just mentioned. If the hæmorrhage be connected with suppression of the catamenia or hæmorrhoids, the feet should be plunged in warm water, and a vein opened in each foot. If the hæmoptysis is moderate, a number of leeches may be applied to the tops of the thighs or around the anus. The derivation produced by these means, and the effects of the latter in restoring the suppressed, discharge, should not be neglected. Celsus advises cupping to be performed in these situations, especially when the disease is thus associated.

127. *b.* It often happens, when hæmoptysis ceases, after a small or a single bloodletting, or when the pulse rises in strength and frequency, that the hæmorrhage returns in one, two, or three days, or after a longer interval. This mostly occurs in young or plethoric persons, where the discharge is connected with congestion of the lungs, or when the first attack has been slight, and the venesection sufficient merely to give a greater freedom of vascular action, without removing the pulmonary congestion or determination. In these cases, bloodletting should be repeated, in order to prevent a renewed attack, especially if the pulse rise after the first depletion, and if signs of inflammatory action in the lungs or bronchi appear. The patient should be carefully watched after the first discharge, and daily examined by the stethoscope and by percussion; and, upon the first indication of returning hæmorrhage, or of supervening inflammation, blood ought to be taken away in one or other of the modes just stated, according to the peculiarities of the case.

128. Where the antecedent disease, the quantity of blood discharged or removed by venesection, and the manifest asthenia from these or other causes, forbid further depletion, recourse must be had to *derivatives*, *astringents*, and *sedatives*, generally simultaneously or in combination. Indeed, even in those cases which evince increased action, and require decided or repeated depletion, these, as well as refrigerants, ought to be brought as early as possible into simultaneous or successive action. The feet and hands ought to be plunged in warm water, and if venesection be not performed in the former situation, mustard or salt, or both, should be added to the water. An enema with an ounce, or an ounce and a half of spirits of turpentine, should be administered forthwith; and other means appropriate to the case prescribed. But as to these means much difference of opinion will necessarily exist. The internal use of astringents is generally adopted; but those usually employed can have little effect, excepting in slight or protracted cases; and even powerful astringents taken into the stomach will have little or no influence upon the bleeding part before a number of hours have elapsed. From observing the rapidity with which oil of turpentine is absorbed, and passes off by the kidneys and lungs, I have been induced to employ this medicine in preference to others as an astringent in hæmoptysis; prescribing it in small or large doses according to circumstances, and as it seemed desirable to act at the same time more or less decidedly upon the bowels or kidneys.

129. In advising sponging with vinegar and rose-water, or sprinkling cold water on the breast, I had especial reference to the sympathetic influence these may have upon the bleeding surface, and the reaction in the skin which they subsequently occasion, especially when they are also applied to the face. When these means have not succeeded, I have, on several occasions, prescribed rubefacients, instead of cold applications, to the chest; as these last are more frequently injurious than beneficial in such cases. An epithem with oil of turpentine, either tepid or warm, allowed to remain on the breast, or between the shoulders, until it occasions a burning sensation and redness, is the rubefacient I have preferred, as the quickest in its operation, and the most conducive to the removal of congestion or of inflammatory action. The vapour also of the turpentine is diffused around the patient, and being inhaled during inspiration, assists in constringing the vessels of the bleeding surface. Where there appears any objection to this application, a *sinapism*, or a piece of flannel soaked with either of the *liniments* (F. 296. 311.), may be placed upon the chest. *Blisters* may also be resorted to. I agree with Lentin, Ranoë, and Percival, in the propriety of applying them to the back or between the shoulders.

130. *c.* Besides the above means, others may be employed; the practitioner being guided in his selection by the peculiarities of the case, and es-

pecially by the previous treatment, by the state of vital power and vascular action, and by the presence of cough and febrile symptoms. It should be kept in mind, that the sooner the hæmorrhage is arrested, the least likely is infiltration of the bronchi and its consequent evils to take place; and that, whilst this — *the first indication of treatment* — is receiving attention, the accumulation of the effused blood, and the consecutive effects upon the bronchi and lungs, and through them upon the system, ought to be prevented as far as possible.— The treatment already described, with reference to hæmorrhage in general, is, in great measure, appropriate to hæmoptysis, according to the principles of its application already advocated. Most of the information that will be here conveyed may be viewed chiefly as suggestions, which the practitioner will receive or reject, as he may deem proper, or which he may apply to practice as the features of the disease may warrant. He ought, however, to be impressed by the fact that, however high vascular excitement may appear, vital tone is more or less impaired; that in proportion as tone becomes diminished, so will the tendency to infiltration of the bronchi or lungs with the effused blood, and to capillary congestion of them, be increased; and, consequently, that vascular depletions and other vital depriments, although often requiring promptitude and decision, should be employed with discrimination and caution.

131. *d.* Of the various *astringents* recommended in hæmoptysis, the *acetate of lead*, conjoined with opiates or other sedatives, as advised by Reynolds, Latham, Davies, Valentin, Amelung, and others, is one of the most deserving of adoption. It may be given more freely than has generally been done, as shown by Dr. A. T. Thomson, if it be conjoined with acetic acid, this acid being itself one of the best remedies when taken in sufficiently large quantity. Of this the ancients were fully aware, as it was employed most liberally by them. The *mineral acids* appear to be preferred by Henning, Doemling, Haller, Joerdens, Loeffler, Schulze, and others; and by most of the moderns. I have, however, seen the liberal use of common vinegar more efficacious than these; and it is more generally congruous with the other remedies usually employed. Indeed, where the acetate of lead is given, the mineral acids will either neutralise its effects or prove injurious. The *gallic acid*, dissolved in water, or in ether, or in alcohol; and the powder or tincture of galls, may be mentioned. Ruspini's styptic is supposed to be a solution of this acid in ether or in spirit; and may also be tried, on account of its reputed efficacy.* Of other astringents, little additional mention need be made. They are sometimes useful in the more adynamic states of the disease, or after large losses of blood, or copious depletions. When debility is urgent, those which are most tonic may be selected, as the tincture of the muriate of iron; the sulphates of iron, or of alumina, or of zinc, or of quinine — the two latter in the infusion of roses with sulphuric acid; and the vegetable astringents, as catechu, kino, uva-ursi, extract of logwood, rhatany, pomegranate bark, &c. The mineral acids, as well as the other astringents, may be conjoined with opium or other anodynes. — A strong solution of alum, and alum whey, for common drink, have been very generally employed by both ancients and moderns.

132. *e. Refrigerants* are required in the more febrile and active states of the disease, as adjuvants, chiefly of depletions, and other antiphlogistic remedies. They are further beneficial by acting upon the kidneys. *Nitre*, in considerable or frequently repeated doses, is recommended by Gibbon, Dickson, Hartmann, Hufeland, and many others. It is much used by the Italian physicians, in large doses, conjoined with demulcents. They give from three to six drachms in twenty hours. It is also beneficially associated with camphor, the acetate of ammonia, and sweet spirits of nitre (F. 95. 294. 747.), or with the *boracic acid* (F. 644.), and with conserve of roses. The *muriate of ammonia* is equally serviceable, especially in the more passive states of hæmoptysis, when it is advantageously conjoined with muriatic acid (F. 864.). Lentin advises it to be taken in half a drachm every two hours, with an equal part of extract of liquorice. The internal use of ices or of iced fluids, has been advocated by many writers. But, like all other active means, they require discrimination. In the passive states of the disease — where asthenia is apparent, the circulation languid, and the temperature not much above the natural standard, they are injurious.

133. *f.* Alvine evacuations are serviceable by removing morbid matters and obstructions to the portal circulation, and by deriving from the seat of hæmorrhage. — *Purgatives* ought, therefore, never to be neglected; and, unless when the hæmoptysis is so abundant as to be alarming, they should precede, or be alternated with, astringents; or such of these latter as will not confine the bowels ought to be selected. The exhibition of an *emetic*, previous to the purgative, has been advised, especially by Stoll, Darwin, Plenciz, Ranoé, Doemling, Paulini, and Schmidtmann; whilst Frank and some others think them hazardous. When the hæmorrhage has been already copious, or after bloodletting has been resorted to, an emetic of ipecacuanha, or of sulphate of zinc, or of a combination of both, is serviceable, not only in aiding the arrest of the effusion, but also in evacuating the blood accumulated in the bronchi, and thereby preventing the ill effects which this fluid would produce if it were allowed to remain. It is not merely the vomiting caused by an emetic which is beneficial, but the effect which is produced upon the heart's action. It is with reference chiefly to this latter operation — to its contra-stimulant action — that emetics and *nauseants* have been recently employed on the Continent, especially in Italy, and by Laennec and others in France. In the passive or asthenic forms of the disease, nauseants, especially the tartar emetic, may be injurious — even in the same case, wherein an emetic of sulphate of zinc might prove of service. As to *purgatives*, the neutral salts, with an excess of acids, as the sulphates with sulphuric acid in infusion of roses, or the supertartrate of potash, in the form of electuary, are the most generally appropriate — with the exception, perhaps, of oil of

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* Dr. A. T. Thomson states that this styptic consists of gallic acid, a small proportion of the sulphate of zinc, and of opium, dissolved in a mixture of alcohol and rose-water. This combination is judicious in most hæmorrhages.

turpentine, conjoined with castor oil.—These oils may be taken on the surface of an aromatic water or of milk, and be administered in enemata.

134. *g.* In exhibiting *anodynes*, the probability of their being injurious in the asthenic states of hæmoptysis should be recollected. When the powers of the system are inadequate to procure the excretion of the fluid effused into the bronchi, they ought to be given with caution, or in conjunction with tonic astringents, or with expectorants. *Colchicum* has been recently recommended, but it is only in the active states of the disease that it ought to be exhibited (F. 545.). *Digitalis*, however, is more generally prescribed. It is recommended by Withering, Jones, Ferriar, Heusinger, Valentin, Carson, Henry, Horn, and others. It may be conjoined with astringents (F. 544.), narcotics, or other appropriate remedies (F. 514, 515.). — *Narcotics* are most serviceable when cough is urgent — by allaying the irritation, and diminishing the risk of the perpetuation or recurrence of the effusion from this cause. But when the hæmorrhage has ceased, and when breathing is difficult, the lungs congested, or the bronchi obstructed, by the effused blood, narcotics, especially in large doses, will only retard the discharge of the effused blood, and increase the mischief, unless they be conjoined with expectorants, as the senega, or benzoin, benzoic acid, myrrh, assafœtida, the balsams of Peru or of Tolu, the terebinthinates, or camphor. In the passive states of the disease, or after large losses of blood, the balsams, both natural and artificial, especially those prescribed in the *Appendix* (F. 18—22.), are often beneficial. The balsam of Locatelli is very much employed in the Continent in hæmoptysis, and, from its composition, it seems very appropriate to most circumstances of the disease. The turpentine is the active ingredient, not only of it, but of the other artificial balsams prescribed in hæmorrhagic affections. The following is the usual mode of preparing it: —

No. 241. ℞ Olei Olivæ ℥ viij.; Terebinthinæ, Ceræ flavæ, āā ℥ iv.; Pulv. subtiliss. Ligni Santali rubri ℥ ss. Ceram in Olei pauxillo solve, dein reliquum, Terebinthinam, Lignumque Santali adde, et assiduè move donec refrixerunt.

135. *h.* There have been various other means recommended for the arrest of hæmoptysis, but many of them are not deserving of notice, and are therefore not here adverted to. The application of *ligatures* on the extremities was a disputed practice with the ancients, although most of them recommended them. J. P. Frank and J. Frank approve of them, and direct them to be placed high above the knees and elbows in such cases as admit not of bloodletting, owing either to the profuse hæmorrhage, or to constitutional adynamia. *Ipecacuanha* in small doses frequently repeated is praised by Loeffler, Hennings, Aaskow, Keck, and Niemann; and by De Meza and Horn, conjoined with opium; the *secale cornutum*, by Spazani, Negri, and Ryan; a strong solution of *common salt*, by Percival, Doemling, Michaelis, and Rush; the turpentines, by Young, Boyle, and Adair; and the *comfrey*, with aromatic sulphuric acid, by Wendt. With Marryat and numerous practitioners, mixtures containing nitre or alum, gums, and some one of the balsams, constituted the principal anti-hæmorrhagic remedies; and vascular depletions were proscribed. It cannot be doubted that bloodletting is often unnecessarily directed in hæmoptysis, or carried too far; but in the active or inflammatory states of the disease, and when the discharge is scanty or small, it should not be neglected.

136. *i.* A few authors have questioned the propriety of arresting the effusion in certain circumstances. Dr. A. T. Thomson remarks, that when the hæmoptysis "is not of an alarming character, and there is no obvious predisposition to tubercular consumption, especially if it be the consequence of a suppression of the menstrual discharge, it should only be moderated, not checked suddenly, which might induce a congestion in some organ less capable of supporting it with impunity." This is most dangerous doctrine; for, if the hæmorrhage be judiciously treated, the sooner it ceases in consequence the better. Hæmoptysis, in the circumstances stated by this writer, ought to be treated by depletions, derivatives, and other measures calculated to restore any suppressed discharge. The cases are very few in which there is no "obvious predisposition to tubercular consumption," and they are still fewer in which the suppressed discharge is the cause of the pulmonary disease; this latter, in either its more concealed or obvious states, almost always preceding, and even being the chief cause of, the suppression. It should be kept in view, that however moderate the hæmorrhage may appear to be, it is difficult to determine how far it may be attended by infiltration of the bronchi; and that the continuance of it, by filling these vessels, will risk the supervention of inflammatory irritation or action in them, and often also in the substance of the lungs and pleura; as well as hasten the development and progress of the tubercular productions.

137. *k.* The practitioner is not to rest satisfied with having fulfilled the first intention — *the arrest of the hæmoptysis* — his attention should immediately afterwards be directed to the *removal of any blood that may have collected in the bronchi, and of whatever inflammatory irritation connected with it either coetaneously or consecutively, that may exist.* Where a crepitation is present, and is much diffused through the lung of one or both sides, more generally of one, fluid is present, and it is either a mucous lymph, or blood, or both, with more or less serum; the state of the expectoration indicating the proportions of either. But the blood may not be expectorated, or may undergo changes previous to expectoration, and clog up the bronchi and air-cells, and either perpetuate inflammatory action, or excite it anew. In the slight forms of hæmoptysis attendant upon tubercles, the effusion of blood is frequently one of the consequences of the inflammatory irritation existing in various parts of the bronchi, connected with impaired tone and congestion of parts of the substance of the lungs. Now, by what means is the above consecutive condition to be removed? When the attack has been treated actively, the more antiphlogistic means having been employed, and the lungs still remain embarrassed, manifestly from a portion of the effused blood, or from the fluid subsequently exuded, the exhibition of an *emetic*, and the repetition of it, as circumstances may indicate, will prove most serviceable. If febrile action, heat of skin, &c. be still present, then tartar emetic, ipecacuanha, or both, may

be thus employed; but when the vital powers are sunk, and asthenia is very prominent, the sulphate of zinc should be preferred. In cases characterised by relaxed, thin, or weak fibres, and general flabbiness of the soft solids — where bleeding would be injurious, *emetics* are frequently most beneficial. — They have been often advised in hæmoptysis; but the indiscriminate or inappropriate use of them, and the somewhat empirical recommendation of them by Dr. Marryat, have led to their disuse. I have, however, often prescribed them with great benefit. This writer directs two grains of tartarised antimony to be first given, and, as soon as nausea commences, two grains of sulphate of copper, dissolved in a little water. He deprecates blood-letting, and, after the sickness has gone off, gives twenty drops of the balsam of copaiba, night and morning, for several weeks, to prevent a return of the attack, and the size of a nutmeg of the following electuary, twice or thrice a day: —

No. 242. ℞ Pulv. Cinchonæ ʒvj.; Sulphuris Sublimati ʒiij.; Potassæ Nitratis ʒj.; Sulphureti Antimonii Præcipitati ℈j.; Mucilaginis Acaciæ, q. s. ut fiat Electuarium.

138. I have no doubt of this treatment being quite appropriate to many circumstances of the disease; and, even in those cases where inflammatory action may supervene after the hæmorrhage has ceased, it may prove beneficial, especially if local depletion by cupping; external derivation by blisters, sinapisms, terebinthinated epithems or liniments, or by issues or setons; and suitable regimen, be employed. In order to fulfil the intention stated above, as well as to *prevent the return of the hæmorrhage*, the assiduous adoption of these external irritants, the internal use of the balsams or terebinthinates (F 18 — 22.), and an emetic occasionally, to unload the bronchi of accumulated fluids or mucosities, will prove most serviceable. At the same time, the digestive and excreting functions ought to receive due attention; and cough or irritation should be allayed by the combination of narcotics and sedatives, as conium, hyoscyamus, opium, &c.; and of emollients or demulcents, with the above, or other suitable medicines. When the hæmoptysis assumes a periodic form, which rarely is observed, the combination of the sulphate of quinine with alum or with sulphate of zinc (F. 597. 667.), or the electuary just prescribed, according to Marryat, will generally prove successful.

139. *l.* The *inhalation* of watery or medicated vapours has been recommended in hæmoptysis, and lately employed by both rational and empirical practitioners. I have tried several substances, and in various combinations, through this medium. The practice requires much caution; but I think it will be found often of service if discrimination as well as perseverance be observed in respect to it. Towards the decline, or in the slighter forms of hæmoptysis, the more astringent substances may be used in this way, care being taken, that they neither occasion irritation or tightness in the thorax, nor excite cough. Those which I have tried in this state are — common vinegar, sometimes with a little camphor, or with a small quantity of turpentine; the pyroligneous acetic acid, kréosote, and common tar. These were put in an inhaler with hot water, and the vapour inspired in the usual way; or in a large basin, and hot water poured upon them, and the vapour allowed to diffuse itself around the patient. When a terebinthinated epithem, or liniment (F. 300. 311.) is used, the vapour from it will generally be sufficient. Some time after the hæmorrhage has ceased, the cautious adoption of this practice will be serviceable; and either these or other substances — as benzoin, assafœtida, galbanum, myrrh, and other odoriferous resins, oil of aniseseed, may be employed in this way, as directed in the article Bronchi (§ 100.). In the more *asthenic forms* of the disease, when the expectoration is copious, or is tinged with very dark blood, the diffusion of the vapour of the above substances in the air of the patient's apartment, and the taking of frequent deep inspirations, will frequently prove beneficial. If the patient evince indications of coexistent or consecutive *inflammatory action*, *emollient vapours* (see art. Bronchi, § 76.), with the addition of the extract of conium or of hyoscyamus, or of stramonium, to the warm fluids employed for inhalation, will be extremely useful, especially if cough be severe.

140. *C.* The *regimen* during and after hæmoptysis is a most important part of the treatment. *a.* The ancients advised cooling beverages and diet. They allowed acid wine, and acerb or acid fruits. The *pomegranate* was much and deservedly praised by them, on account of its cooling and astringent operation. Glutinous and mucilaginous articles of diet were also recommended. All these deserve adoption. The principal question is, as to the diet which should be adopted. Dr. Stewart, some years ago, advised nourishing diet, cold sponging the surface, cold bathing, and exercise in the open air, and frequently with advantage. To persons of a relaxed habit, with a slow or natural pulse, and to those not suffering from febrile action, this plan is generally appropriate; very dilute acids, or lemonade, or common vinegar and water, being the usual beverage. He directed the whole surface of the body to be sponged in the morning; and the neck, breast, and shoulders at night, with tepid vinegar and water gradually reducing the temperature to that of the surrounding air. After the sponging, frictions with flannel or the flesh-brush for half an hour were enjoined. Cold bathing and salt water bathing were afterwards employed, and continued until recovery took place. Dr. Stewart advised this method in both febrile and non-febrile — in acute and chronic cases. In the non-febrile and chronic it is often serviceable, and, early in the febrile, it may also be occasionally useful. Sponging the surface, and assiduous friction immediately afterwards, are applicable to most cases; but the diet requires greater discrimination. Where fever is present, animal food increases the patient's ailments. In those, farinaceous, glutinous, or mucilaginous substances only should be allowed, with goat's whey, stale butter-milk, grapes, raisins, the fruit of the carob or St. John's bean, asses' milk with Seltzer-water, &c.

141. *b.* The propriety of having recourse to repeated small depletions, or to a moderate blood-letting, about each equinox, in order to prevent the recurrence of hæmoptysis, has been insisted on by some writers, and when the effusion depends chiefly upon plethora or active determination to the lungs, the practice may be of service;

but when it occurs in the progress of tubercular phthisis, it may be injurious if indiscriminately adopted, although it may be of use in those cases in which subacute inflammatory action, or congestion of portions of the lungs often complicate the tubercular formations, and occasion the sanguineous discharge. In the more asthenic states, depletions favour the progress of the tubercles, and are more or less injurious. The regulation of the excretions; the restoration of suppressed evacuations or accustomed secretions; occasional change of air; residence in a mild, humid, and equable climate; sea-voyaging; gentle exercise in the open air; flannel clothing next the skin; cold sponging the surface; acidulated drinks; light and nourishing food, mental quietude, and the avoidance of whatever depresses the vital powers, are severally productive of benefit: some of them ought not to be dispensed with. Exertions of the voice, playing on wind instruments, venereal indulgences, warm baths, and exposure to vicissitudes of the weather and season, ought always to be shunned. (See art. TUBERCULAR CONSUMPTION.)

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VI. HÆMORRHAGE FROM THE STOMACH.

SYN. — *Hæmatemesis* (from αἷμα, gen. -ατος, blood; and εμεσις, vomiting), Linnæus, Sagar, Vogel, Sauvages, Pinel, Good. *Vomitus cruentus, vel vom. sanguis, vomitio sanguinis*, Auct. Lat. var. *Hæmorrhœa ventriculi*, Swediaur. *Gastrorrhagia; Æsophagorrhagia; Morbus niger; Fluxus splenicus*, Auct. *Vomissement de Sang, Hématémèse*, Fr. *Blutbrechen*, Germ. *Vomito di Sangue, Ematemesi*, Ital. *Vomiting of Blood.*

142. DEFIN. — *A vomiting of a dark-red, black, fluid, or semi-coagulated blood, sometimes pure, at*

other times mixed with a ropy or watery fluid, or other matters contained in the stomach; preceded by nausea, oppression, tension or heat of the epigastrium, sometimes by faintness; unattended by cough; and frequently accompanied with very dark-coloured, grumous or pitchy stools.

143. i. Pathology.—Like dropsy — of which it may be either an antecedent or epi-phenomenon — vomiting of blood is seldom an idiopathic or primary disease, but generally the consequence of certain pre-existing changes, sometimes chiefly seated in the stomach, at other times in the collatious viscera, as the spleen, liver, or pancreas, and occasionally in some two or more of these organs. The blood may proceed from the mucous surface of the stomach, which is most commonly the case; and from the surface of the duodenum, or of the œsophagus. It is generally poured out from the congested, dilated, and weakened capillaries and exhaling pores of this surface; but it may be effused either from a limited part, or from a few small vessels chiefly, as when it depends on a congested or other morbid state of the spleen, or on ulceration, or from one or more diseased or ulcerated vessels, which latter is but rarely the case. It may proceed, also, from the rupture of an aneurismal tumour which has poured its blood either directly or mediately into the stomach; or, as supposed by some to happen in a very few instances, it may even flow along the ducts from the liver into the duodenum, from whence it may be partly regurgitated into the stomach; but this is extremely doubtful. The blood may, however, as shown above, pass from the posterior nares or throat, or from the respiratory organs, into the stomach, and be afterwards vomited, and thus hæmatemesis may be closely simulated.

144. Besides these sources of the hæmorrhage, it is of importance to recognise the general condition of vital energy of the system accompanying it, as well as the state of action which the heart and arteries may evince. Hæmatemesis is attended with almost every grade of vascular action, from the lowest state of sub-action, to the most acute action; but more frequently the vascular system is deficient of vital tone, and this condition is extended, more or less, to all the soft solids of the frame. In a very great number of cases of this disease, also, we observe a state either of general cachexia, or of congestion, morbid function, or morbid structure, of more than one of the abdominal viscera.

145. Hæmatemesis is, more commonly than is generally stated by authors, a mode of termination, or a consequence, of inflammation, or of inflammatory irritation and congestion of the internal tunics of the stomach and duodenum, particularly when it presents signs of sthenic action, or is preceded by cardialgia, acute pain, tenderness, distension, and a sense of heat in the region of this organ, or when it occurs in young, plethoric subjects, and is caused by ingurgitation, by acrid matters received into the stomach, by the use of inebriating fluids, and by the suppression of accustomed discharges. In this *inflammatory form* of the disease, the blood thrown from the stomach is seldom in large quantity at one time, although frequently ejected, and is of less deep colour than in some other varieties; and that taken by venesection is usually cupped and buffed. I agree, however, with Quarin, Richter, Frank, and Schmidtmann, that this disease is more frequently accompanied with an asthenic, than sthenic, state of the vital powers.

146. It is of the utmost importance to appreciate justly the foregoing states, as upon them are chiefly based our opinions respecting the exact nature of the disease, and the most successful mode of removing it. In the following observations I shall notice — *first*, the primary and less complicated state of hæmatemesis; *secondly*, the supplemental, succedaneous, or vicarious forms of this disease; *thirdly*, hæmatemesis from disease of the viscera connected with the stomach; *fourthly*, hæmorrhage from certain organic lesions of the stomach, or of its vessels, and from complications with other diseases; and, *lastly*, that rarer form of hæmatemesis, which, from the colour of the ejected fluid, has been called the *morbus niger*.

147. *A. Primary or Simple Hæmatemesis.*— This form of the disease is entirely dependent upon the state of the mucous surface of the stomach, or upper portion of the duodenum. It may arise from a constitutional tendency to hæmorrhage, heightened in this particular part of the digestive mucous surface by some of the exciting causes of the disease, especially by an excessive use of vinous or spirituous liquors, or by both, and by general vascular plethora. It seems to be preceded by, and even to consist in, a more or less congested, weakened, or atonic state of the extreme venous capillaries arising in this surface, connected with similar states of this surface itself (see art. Digestive Canal). But, conjoined with these states, there may exist increased action of the vessels supplying the bleeding surface. When it proceeds chiefly from the former of the conditions now referred to, there are generally appearances of deficient tone throughout the soft solids of the body. The blood ejected is dark-coloured, or grumous; and although there may be pain or tenderness of the epigastrium, there is no sense of heat, or sign of increased or sthenic vascular action.

148. When it depends more upon local determination, or increased action, arising from an irregular distribution of the vital energies with which the vascular system, or particular viscera, is endowed; or when it is consequent upon the state of inflammatory congestion referred to above (§ 145.), the vomiting of blood is either preceded by, or accompanied with, a frequent, soft, open, and sometimes small, pulse, by a sense of pain or tenderness, and of heat, at the epigastrium, with other symptoms of gastritis; and the blood thrown up is redder and more fluid than in the foregoing case, and seldom in very large quantity; but is sometimes mixed with portions of lymph or with substances of a fleshy or fibrinous appearance. This particular state of the disease is often connected with a plethoric state of the vascular system, particularly of that part forming the portal system. When this obtains, the history of the case the preceding causes, and circumstances connected with it, will assist us in forming a diagnosis. The patient generally is of a full habit of body, or he presents appearances of vascular plethora. The pulse is full, broad, and strong, and there is often fulness of the abdomen, particularly towards the epigastrium and hypo-

chondria, but without that degree of fulness, tumefaction, pain, or tenderness in the hypochondria, which attends upon serious disease of the spleen or liver, and which accompanies the third variety (§ 151.). This form of hæmatemesis in delicate constitutions, or in those predisposed to hæmorrhagic disease, occasionally follows upon acrid or irritating substances taken into the stomach. Thus it has been produced by the irritation of an emetic, and by acrid poisons. Warton, Glisson, and Hoffmann, have observed it occasioned by the use of irritating emmenagogues. It may assume a chronic, remittent, or periodic character. In two instances, in which it was occasioned by the daily excessive use of intoxicating liquors, it recurred every morning for several weeks; and, in one of them, was followed by a most violent attack of gout.

149. *B. Succedaneus or Vicarious Hæmatemesis.* — This form of the disease is not of infrequent occurrence. It is noticed by several authors, and particularly by Ballonius, Hoffmann, Forestus, Whytt, Riedlin, Thomann, Pinel, and others, and has come before every experienced practitioner oftener than once. It generally arises from those causes which suppress suddenly, or prevent the return of, the *menstrual discharge*, or the *hæmorrhoidal flux*. It may even replace an habitual *epistaxis*, or occur in females in the form of misplaced catamenia, this part of the uterine functions not having appeared. In the majority, however, of such cases, the hæmatemesis has been occasioned by some evident cause, and in its subsequent occurrence, it has assumed a periodic or vicarious form. This form may even manifest itself from the commencement, as where it has occurred instead of the catamenial evacuation, which has either not appeared, or been but imperfectly established.

150. From whatever cause this state of the disease may proceed, it evidently arrests or prevents the discharge the place of which it supplies; and, although it cannot be generally shown to depend upon previously existing disease of the stomach, or of the viscera intimately connected with this organ, yet we may suppose that the mucous surface and vessels of the stomach have been disposed to experience congestion, local determination, or the morbid conditions on which hæmorrhage has been shown above to depend. Possibly, also, the morbid states of the surrounding viscera may have been such as to assist in producing the hæmorrhage, although these states cannot be generally recognised, owing either to their slight extent, and the obscure or imperfectly developed phenomena attending them, or to our imperfect powers of observation. When hæmatemesis is consequent upon, or vicarious of, hæmorrhoids, particularly in aged or intemperate persons, a morbid state of the liver, as respects either its functions or its structure, as well as of the stomach, may reasonably be inferred, so far at least as to lead to an intimate examination of the state of this organ. Admitting the frequency of this morbid relation, we cannot, however, infer its constant existence, seeing that we often fail in detecting it, and of observing it after the hæmatemesis has ceased. It seems, therefore, more correct to infer that, in cases of this description, the sanguineous effusion is often a consequence of inflammatory congestion of the villous coat of the stomach and duodenum, which has taken place more suddenly, and induced more rapidly the effusion than in some other forms of the disease.

151. *C. Hæmatemesis from Disease of the Viscera connected with the Stomach.* — The vomiting of blood in this form of the disease is *symptomatic* of congestion or structural change of the spleen, liver, or pancreas, or even of some other abdominal viscus. This is the most frequent form of hæmatemesis. A congested state of the stomach, and even also of the duodenum, being caused by obstructed circulation through, or other disease of, one or more of these viscera, any accidental irritation, or whatever increases the congestion on the internal surface of the stomach, may occasion the effusion of blood from it. Most frequently, perhaps, the hæmorrhage is produced by obstruction, enlargement, or some other lesion of the spleen, the anastomoses of the vessels of this organ with those of the stomach favouring its occurrence. When hæmatemesis arises from disease of the liver or spleen, the history of the case, the presence of fulness or tumefaction, tenderness or pain, in the hypochondria and epigastrium: symptomatic pains about the shoulders or shoulder blades, an unhealthy or sallow state of the countenance, and chronic functional disorder of the stomach and bowels, will generally be observed. The discharge of blood in this form of hæmatemesis has sometimes acted as a critical evacuation, the symptoms of congestion of the liver or spleen, or of both, which had existed, having been removed by it, and health restored. Instances of this kind have been recorded by De Haen, Frank, Portal, Pinel, Schmidtmann, and others, and have occurred to myself, particularly in persons who had suffered long from ague. More frequently, however, the hæmorrhage has furnished only a temporary advantage, the disease of the liver or spleen, which it had relieved, again returning, followed by an attack of hæmatemesis and another period of relief; or terminating fatally, dissection disclosing the extent of the disease of which the hæmorrhage was merely a symptom. In this variety, the blood thrown up is generally of a dark colour, and either fluid or grumous, and consisting of small coagula. The stools are also morbid — frequently black, pitchy or grumous, loose, and very offensive. The hæmorrhage is often preceded by, complicated with, or followed by, dropsy of the abdomen, or of the lower extremities, or both; but rarely with hydrothorax, unless it have followed the effusion into the peritoneal cavity. In some instances, obstinate diarrhœa or dysentery has supervened, especially in warm or miasmatous climates.

152. I agree with Tralles (*De usu Opii*, vol. ii. p. 29.), who has strongly insisted on the frequently active or sthenic state of the vessels in hæmatemesis, that, in the preceding forms, the impeded or obstructed return of blood through the veins frequently occasions an augmented action of the arteries; and, as the blood cannot pass in sufficient quantity, or with requisite celerity, by the veins, that it is determined with greater impetus into the extreme arterial capillaries, thereby dilating their exhaling pores, and being effused into the cavity of the organ. Some degree of vascular reaction may also take place

on the villous surface of the stomach from this circumstance, giving rise to the membranous pieces of lymph which are sometimes ejected along with the blood, or subsequently.

153. *D. Hæmatemesis from Disease of the Coats or Vessels of the Stomach, and from other Maladies.* — The discharge of blood from the stomach may arise from ulceration having extended into one or more vessels; or from disease of the coats of an artery or vein, or from atheromatous or other deposits in the coats favouring their perforation or rupture. Such occurrences are, however, very rare. In a case of extensive and fatal hæmatemesis consequent upon scirrhus of the pylorus, in an aged man, attended by Mr. Byam and myself, the arteries of the stomach were found studded by atheromatous deposits, and the coats of a considerable arterial branch were at one part destroyed by them, an opening from the interior of the vessel into the stomach having been detected after a minute examination. The effusion may even proceed from perforation and adhesion of the stomach to the liver or spleen, ulceration having extended to these viscera. It may also occur in an advanced stage of scirrhous ulceration of the pylorus or cardia; or from tumours, particularly those of a malignant character, in the parietes of the stomach; but in these cases the hæmorrhage seldom proceeds from the ulcerated part or from the tumour, unless they be of a fungoid kind, the blood being exuded chiefly from the villous surface of the organ. Hæmatemesis may be also occasioned by any lesion causing hæmorrhage from the internal surface of the œsophagus, or from the bursting of an aneurismal tumour or varix in this situation as well as in the stomach itself. When the effusion takes place from the œsophagus, the blood generally passes in the first instance into the stomach, whence it is ejected with the contents of this viscus by vomiting; but it is sometimes eructated or gulped up without nausea or retching.

154. Blood is occasionally thrown off the stomach in the progress of continued fevers, particularly of those of an adynamic or putro-adynamic form; and of those complicated with predominant disease of the stomach, liver, or spleen. It is also sometimes vomited in long-continued remittent and intermittent fevers, and more rarely in the exanthemata. Hæmatemesis has even ushered in severe attacks of smallpox and scarlet fever; and has sometimes supervened in the course of hooping-cough, particularly in plethoric and cachectic persons, and in those affected with visceral disease. It is not unfrequently symptomatic of scurvy or purpura hæmorrhagica; the blood being exuded from the extreme vessels in consequence of deficient tone and weakened vital cohesion of the villous coat of the stomach, and of the whole digestive canal. In these latter complications, the quantity of blood evacuated by stool is often greater than that thrown off the stomach. Lastly, hæmatemesis sometimes occurs in persons affected by intestinal worms, especially tænia and lumbrici. It is, moreover, occasionally complicated with hysteria and disorder of the uterine functions. It not infrequently alternates with, or is supplemental of, some other hæmorrhage.

155. In the first and second of the foregoing states, constituting the more *idiopathic* varieties of hæmatemesis, as well as in the third and fourth, forming the *symptomatic* and *complicated* conditions, the appearance of the stools is the next deserving of attention to the quantity and state of the blood thrown off the stomach. In many cases, the quantity of blood passed from the bowels is greater than that vomited. This happens most frequently when the blood is slowly effused, without irritating the stomach. It then passes the pylorus, and undergoes a partial digestion, or mixes with the secretions poured into the alimentary canal; imparting a very dark colour, or pitchy or black grumous appearance to the stools.

156. *E. Vomiting of Black Matter* — The *morbus niger* of the ancients.—When the blood continues long congested in the capillaries of the stomach previous to its effusion, it gradually acquires a dark colour, and loses the property of coagulating. When, also, the congestion of the venous capillaries has continued long, the arterial ramifications passing into them necessarily participate in this state, the blood in them assuming venous characters. This condition of the circulation of the organ sometimes occurs, especially in persons of a spare habit of body, of a morose, irascible, and melancholic temper; and of a pale, sallow, or jaundiced countenance; and is attended with, or followed by, pain and distension in the epigastrium and left hypochondrium, flatulence of the stomach, debility or sinking, borborygmi or tormina, and several other symptoms usually indicating the approach of hæmatemesis. At length, during great prostration of strength, or deliquium, ollowed by nausea, and sometimes colicky pains of the abdomen, vomiting of a black tar-like matter takes place, often with similar discharges from the bowels. This matter is occasionally extremely offensive, and is evidently the result of serious changes in the vital action of the vessels of the stomach, liver, and spleen; the tone of the capillaries, and the healthy cohesion of the digestive mucous surface, being lost, and thereby allowing the exudation of the altered blood into the cavity of the organ, this fluid becoming still further changed by admixture with the acid gastric juice and exhalations poured out by the villous surface. It will be seen from this, that I consider the discharge of a black matter from the stomach as a modification or variety of hæmatemesis, occurring in an extremely asthenic state of the frame, and most probably from some degree of perverted function, not only of the stomach, but also of the liver and spleen. It may be also inferred that a morbid state of the secretions from the mucous follicles and liver may co-exist with these changes, and that the admixture of those secretions with the effused blood may deepen the already dark colour of this fluid; but this effect is chiefly produced by the free acid shown by Dr. Prout to exist in the gastric juices.

157. ii. Causes.—*A.* The *predisposing causes* of hæmorrhage from the stomach are,—hereditary conformation and disposition to hæmorrhagic affections; the female sex; the sanguine and irritable temperaments, and the melancholic and the hypochondriacal, especially in persons with a pale, sallow, or earthy appearance of countenance; the full and plethoric habit of body, and irascible disposition; indolent and luxurious modes

of life, particularly when adopted soon after puberty; addiction to the use of spirituous liquors, or of inebriating fluids of any description; indulgence in too much food; the continued influence of moist and miasmal states of the air; chronic affections and congestions of the abdominal viscera, particularly of the spleen, liver, and pancreas; the advanced months of pregnancy; and irregularity or suppression of the menstrual discharge. J. P. Frank states that he has met with hæmatemesis most frequently between the thirtieth and fiftieth years of age.

158. *B.* The *exciting* and *determining* causes are — blows and injuries on the abdomen, particularly on the hypochondria and epigastrium; violent concussions or succussions of the trunk; external or internal pressure on the stomach; the ingestion of irritating or hurtful matters into this viscus; the intemperate indulgence in food or stimulating liquors; the presence of worms, larvæ, leeches, &c. in the stomach or upper part of the intestines; the irritation occasioned by morbid or excoriating bile on the surface of the duodenum or stomach; powerful or irritating emetics, especially when given in the advanced stages of fevers, or in cachectic or visceral diseases; the suppression of accustomed discharges, particularly the menstrual or hæmorrhoidal; the application of cold, or of cold and moisture, to the lower extremities or surface of the body, during perspiration or the catamenial period; unusual distension of the colon, owing to habitual or continued costiveness; neglect of the bowels, and consequent accumulation of fœcal matters; violent fits of passion; disease of the vessels of the stomach, or collatitious viscera; the gravid uterus, and large tumours developed in any part of the abdomen. Whatever, in short, irritates the mucous surface of the stomach, or interrupts the return of blood from the organ, will occasionally produce the disease.

159. iii. Symptoms.—*A. Premonitory Symptoms.* —The patient generally complains, previous to the accession of the hæmatemesis, of many of the symptoms of hæmorrhagy, as well as of others peculiar to this species. These are commonly, cardialgia; tension or pain at the epigastrium, with either loss, or increase of appetite; sometimes faintness, or a sense of sinking or of anxiety at this region; flatulent or acrid eructations; lassitude, with irregular chills and flushes of heat; an open, sharp, and soft pulse; a sense of pain, or heat and uneasiness, with distension and tenderness at the epigastrium and left hypochondrium. Sometimes the pains in these situations are severe and pulsative, or extend to the left shoulder and scapula; and there is generally more or less of nausea, expression of anxiety, and pallor of the countenance. In rarer instances the attack commences without any premonitory symptoms sufficient to attract attention; and cases even of death from hæmorrhage into the stomach have been observed by Frank (*De Cur. Hom. Morb.* t. vi. p. 198.) and others to have occurred suddenly, without any external discharge or symptom indicating the cause of sudden dissolution. In some instances I have ascertained that, for a long time previously, evident symptoms of chronic gastritis had been present, of which the hæmatemesis was a consequence.

160. *B.* The *pathognomonic* phenomena of the disease soon succeed to the above: the nausea is followed by increased pain, uneasiness, and tenderness at the epigastrium, and with vomiting of blood, either fluid or coagulated, pure, or mixed with the contents of the stomach. The blood, and other matters thrown up, come away with more or less effort; frequently with comparative ease, even when the hæmorrhage is the greatest, and seldom with much previous retching: it is sometimes gulped or eructated upwards. When the quantity of blood thrown up is great, the effort at ejecting it may sometimes occasion irritation in the pharynx, and excite coughing; and, from this circumstance, cause some doubt as to the seat of effusion; but the history of the case, and an attentive examination of the phenomena (§ 159, 160.), will show the nature of the disease.

161. The appearance of the blood varies with the quantity effused, and the time it has been retained in the stomach, but especially with the state of the vital energies, and of vascular action, previous to, and at the time of, the hæmorrhage. Where the discharge is attended by increased action, and the quantity is large, or when it has been poured from a considerable vessel or vessels, the blood is generally pure and unmixed with the ingesta. Where it has been effused from an artery or ruptured aneurism, it is florid and fluid; but if it have slowly oozed from the congested mucous surface, or depended upon congestion or other disease of the spleen or liver, it is of a dark venous colour, sometimes grumous, at other times fluid, and either pure, or mixed with the secretions or other matters contained in the stomach. In some cases (the *morbus niger* of old authors) the blood is nearly black, of a tar like hue, or grumous, particularly in the hæmatemesis occurring during the progress of old remittent and malignant fevers, where there has evidently existed for some time impaired tone of the mucous surface of the stomach and of its capillaries, and of the vessels of the spleen, with congestion of these viscera, and obstruction of the liver.

162. In some instances, particularly when the disease has been preceded by inflammatory symptoms referable to the stomach, membraniform, polypous, or fleshy substances, are found amongst the coagula ejected from this viscus. These substances evidently proceed from inflammatory action in a part of the villous surface, with effusion of coagulable lymph, this action being followed by, or accompanied with, or even consequent upon, a more or less active hæmorrhage.

163. After hæmatemesis, the patient often experiences much relief from the more severe symptoms ushering it in; and this continues until shortly before a return of the attack, which may be repeated oftener than once, with intervals of relief of irregular duration. When the effusion of blood into the stomach is continued for a prolonged period, the vomiting of this fluid is repeated at short intervals. And occasionally the hæmorrhage occurs, particularly in those addicted to ingurgitation and the immoderate use of spirituous liquors, in short and slight fits, at short and regular intervals. I have remarked it, particularly in persons of a full habit of body who have been addicted to those indulgences, recur every morning, even for several weeks or months, with temporary relief to all the symptoms, and disappear

only occasionally for longer periods than 24 hours. Sometimes a single attack of considerable severity is followed by many months of comparative health; and when it is critical of engorgement of the spleen or liver, it may not again return, under proper treatment. When hæmatemesis is succedaneous or vicarious of some other accustomed sanguineous evacuation, it often recurs at regular intervals, as in the second variety of the affection. After an attack, the bowels are generally relaxed, and the dejections dark-coloured, from the presence of blood in them, and extremely fœtid. Sometimes the stools are quite black, and of the consistence and appearance of tar. This state of the evacuations (*the melæna* of old authors) often continues for some time after the vomiting has ceased; and they are often preceded by colicky pains through the abdomen, distension, flatulence, tormina, and even slight meteorismus.

164. There is seldom much fever or heat of surface; but the pulse is quickened, sometimes full and developed, or even strong, in the more active or sthenic states of the disease, particularly at the commencement of the attack. But in the asthenic states of the system, or as the disease advances, and the attacks are repeated, it is commonly small, soft, and accelerated, and occasionally very compressible and open. The tongue presents various appearances, which depend more upon the concomitant and primary lesions producing the effusion of blood, than upon this occurrence alone. It is sometimes furred, but more commonly loaded at its base, or coated with mucus merely, or it is red, particularly its point and edges, and lobulated, or fissured: sometimes it is apparently raw and livid, particularly in the worst cases.

165. *C. Appearances on Dissection.*—There are few lesions to which the stomach and other abdominal viscera are liable, that have not been found in fatal cases of hæmatemesis. The chief of these, particularly in the primary forms of the disease, are — dark red, purplish, brown, or black patches, streaks, or spots, of the internal surface of the stomach; an enlarged, dilated, or injected state of the capillaries in this surface, permitting, according to the observations of Portal, injections thrown into the gastric arteries to pass into the cavity of the viscus; very rarely rupture of any of the vessels, excepting in connection with ulceration or atheromatous deposits in their coats; generally a relaxed state of the vessels, with diminished cohesion, or a softened, dark-coloured, blackened, tumid, infiltrated, ecchymosed, and flabby condition of the villous and sub-villous tissues; occasionally, a flaccid, dilated, and pale state of the whole organ, the vessels having been emptied by the hæmorrhage; sometimes similar alterations to the above of the internal surface of the duodenum, or of the œsophagus, either independent of (Gaube, in *Rev. Med.* t. i. p. 394. 1825.), or associated with, the foregoing lesions of the stomach; collections, varying much as to quantity, of coagulated, semi-coagulated or grumous, dark-coloured blood in this viscus, and in the duodenum, and of a still darker, pitchy, and fœtid blood, mixed with morbid secretions and fœcal matters, in the intestinal tube; and a nearly empty state of the veins. In some cases, especially of the symptomatic forms, the mucous surface of parts of the small or large intestines presents similar appearances to those seen in the stomach. In a few instances, there is but little change from the healthy state of this viscus, the principal morbid changes existing in the liver or spleen or in the pylorus, or œsophagus; and, in a few others, the mucous membrane is red, injected, and covered in parts by a layer of coagulated lymph or of jelly-like fluid. In addition to one or several of the above lesions, there have been observed, in rare cases, erosion of one or more arterial vessels (Ricard, Latham, Clark, and myself) of the stomach; a dilated or varicosed state of the veins (Rullier), and even rupture of the varicosed veins (Stoll, Roziere); great dilatation of the vasa brevia, the meseraic, mesocolic, and splenic veins, and ulcerations and perforations of the œsophagus and duodenum, as well as of the stomach.

166. In the more decidedly symptomatic and complicated states the various alterations to which the abdominal viscera are liable are severally observed, but those which are more directly connected with hæmorrhage into the stomach are — congestion, enlargement, and softening of the spleen, its vessels containing a black, semicoagulated, or grumous blood; unusual hardness and diminished size of this viscus, portions of it being converted into cartilage, and deposits of bone on its surface; congestion, tubercular formations, interstitial deposits, tumours, scirrhus, atrophy, and other changes in the liver, causing obstruction of the portal circulation; tumours pressing upon the vena porta, and lesions of its coats, or of parts connected with it, diminishing its calibre; enlargement or scirrhous tumours of the pancreas (Van Doeveren, myself, and others); alterations of the coats of the large vessels, and aneurisms, particularly of the aorta, opening either directly or mediately into the stomach, or œsophagus; adhesions of the spleen to the stomach, with perforating ulcers of the latter, penetrating into the former; fungous or other tumours of the stomach or pylorus (Whytt, Niemann, Portal, &c.); scirrhus of the cardiac or pyloric orifices, tumours developed at the root of the mesentery, and organic changes of the kidneys. The most common of these are, the alterations of the spleen and liver, especially enlargement of the former, and lesions of the whole structure of the latter; changes affecting merely a part of the organ, or not materially obstructing the portal circulation, having but little influence in the production of hæmatemesis.

167. *D. Pathological Inferences.*— From the phenomena observed in connection with this disease, both during life and after death, it may be inferred —1st. That the effusion of blood into the stomach is sometimes a termination or consequence of active congestion, or of inflammatory irritation, of the villous surface of this viscus, and sometimes also of the parts of the digestive tube adjoining it—*inflammatory hæmatemesis*;—2d. That the hæmorrhagic discharge frequently arises from interrupted circulation in the spleen or vena porta, or both, and consequent congestion of the veins and venous capillaries of the stomach, causing increased action of the arteries, with dilatation of, and consequent effusion from, the exhalent pores of the congested surface—*congestive symptomatic hæmatemesis*;—3d. That the effusion occasionally proceeds from diminished or lost vital cohe-

sion of the villous surface, and impaired tone of the capillaries of the stomach, with general adynamia—*asthenic symptomatic hæmatemesis*;—4th. That, in rare instances, the hæmorrhage arises from an aneurism, from ulceration or perforation of an artery or vein; and more frequently from malignant, fungoid, or ulcerated tumours in the stomach, or near either of its orifices, &c.—*complicated hæmatemesis*.

168. iv. Diagnosis.—The vomiting of blood is no proof that this fluid is effused primarily from the stomach, or even from the œsophagus or duodenum; for, as I have shown above (§ 91. 99.), very dangerous hæmorrhages often proceed from the posterior nares, fauces, or pharynx, and even from the respiratory organs, yet but little blood escapes externally from these situations, the greatest quantity passing into the stomach, whence, if it be considerable, it is afterwards thrown off by vomiting. Where the hæmorrhage takes place slowly, hæmatemesis does not occur, the blood having nevertheless flowed into the stomach, and thence into the intestinal canal, admixing with the secretions and alimentary matters, and colouring the dejections. Hence the presence of this fluid, even in the stools, is no proof that it has been effused either in the stomach or duodenum, as it may have been, as now stated, poured out from the œsophagus, or from the throat, &c., and have passed downwards instead of upwards. In cases, however, of hæmorrhage from the superior portions of the digestive tube, the blood is more or less changed or intimately mixed with the intestinal secretions and fœcal matters; and the stools present, in their black colour, or their grumous, sanious, or tar-like appearance, indications of considerable remora, or of partial digestion of the effused blood in the alimentary canal.—These appearances may be thus modified, not only by this circumstance, but by the action of the acid in the gastric juice, or by acidity in the bowels, and by admixture with the biliary and pancreatic fluids. They will necessarily also vary with the quantity of blood effused, with the particular seat of effusion, with the state of the system, and with various concomitant circumstances, in respect of the causes and states of the digestive viscera.

169. The diagnosis, therefore, of true hæmatemesis from the vomiting of blood consequent upon the passage of this fluid into the stomach from the pharynx and adjoining parts, requires more attention than has been directed to it; and it is chiefly from a careful inquiry into the history and phenomena of the case, and from the premonitory symptoms referable to the stomach, spleen, or liver, that a correct opinion can be formed.—Where these symptoms have ushered in hæmatemesis, there need hardly be a doubt as to the stomach being the seat of effusion, and in this case the blood is very often dark-coloured, grumous, or coagulated, mixed with portions of ingesta, or with a pale or colourless ropy fluid, or with bile. In some cases, the passage of the blood over the glottis occasions more or less cough, and causes some doubt as to the source of hæmorrhage. In these, however, as well as in others, the absence of the symptoms ushering in, and characterising, *hæmoptysis* (§ 98, 99.), will distinguish *hæmatemesis* from that form of hæmorrhage. The dyspnœa, the bubbling sensation in the trachea and about the top of the sternum, the florid and frothy appearance of the blood, or the presence of bubbles of air in it, are all present in the former, but are absent in the latter. Dr. Watson very justly remarks, that the symptoms usually succeeding the hæmorrhage, in either variety, afford much assistance in forming a judgment in some doubtful cases. Generally copious *hæmoptysis* proceeds for some time in a succession of mouthfuls, whereas there is mostly only one access of full *vomiting*; and, at the close of the former, the patient manifestly coughs up and expectorates smaller quantities of blood, whilst, a few hours after the latter, slight griping pains are felt in the abdomen, and stools such as I have above described are passed.

170. Other circumstances, also, connected with the diagnosis of hæmatemesis, ought not to be overlooked, especially the visceral diseases of which it is frequently a consequence, and the affections upon which it may be contingent, or of which it may be supplemental or vicarious. When blood is vomited in the course of *cancer* or *scirrhus* of the stomach or of its orifices, besides the symptoms indicating these maladies, this fluid is generally changed to a dark or black, grumous, or even inky appearance. When hæmatemesis occurs in the course of *scurvy* or of *purpura*, the circumstances are generally such as to leave us doubt as to its source. If it take place after a fit of *hooping-cough*, it is often difficult to determine whether the blood be discharged from the stomach, or from the respiratory passages; but attention to the phenomena just pointed out (§ 168, 169.) will obviate any error. When hæmatemesis proceeds from a ruptured *aneurism*, or from an ulcerated or ruptured vessel, the quantity of blood thrown up is generally great, and unmixed with other matters, and sometimes more or less florid and fluid. The exhaustion, fainting, pallor, and sinking attending it, are extreme, and a fatal result occasionally soon supervenes; but more frequently the exhaustion and sinking or syncope arrests the hæmorrhage, and the patient apparently makes a short or slight progress in recovery; but after some mental or physical excitement, or after slight exertion, the hæmorrhage recurs, and death either takes place, or another respite is obtained. In many of these extreme cases, a great part of the effused blood is retained, and found in the stomach and intestines on dissection.

171. v. Prognosis.—In proportion to the severity of the symptoms referable to the stomach, liver, and spleen, particularly the pain, tenderness, anxiety, and fulness in these situations, the danger may be considered great. When these are very distressing, the quantity of blood ejected considerable or excessive, dark-coloured, pitchy, fœtid, or grumous; when the vomiting is attended with sinking, with a very quick, weak, small, or an open and compressible pulse, or with signs of cachexia, and of organic disease of any of the abdominal viscera; if it be preceded by symptoms of inflammation of the stomach and adjoining viscera; if it have proceeded from acrid poisons, or from severe injury; if it be attended or preceded by dropsy, jaundice, hypochondriasis, or a sallow, sunk, earthy, or waxy state of the countenance or general surface; if fainting or syncope come on and be protracted, or recovery

from them imperfect; if the eyes be sunk, the features pallid and sharp; if there be great distension and tenderness at the epigastrium and left hypochondrium; and, lastly, if the patient have cold extremities and cold sweats, the danger is generally great, and, with the latter symptoms, extreme.—If the symptoms ushering in the attack, or preceding it for some time, be either imperfectly mitigated, and still more if they be increased by the discharge of blood, an unfavourable inference as to the issue may be formed. If hæmatemesis occur in the last stage of fevers or of the exanthemata, in the old and cachectic, in persons who have gone through a long course of intemperance, or who have laboured under chronic abdominal disease, particularly if the hæmorrhage be great, or impart not relief if moderate, danger may be inferred, although it may not be immediate in the latter circumstances.

172. When, on the other hand, the disease has been caused by a fit of anger, by the suppression of an accustomed evacuation—as the catamenia, hæmorrhoids, epistaxis; or if it be vicarious of these, or when it has occurred on the disappearance or suppression of an external discharge, eruption, &c. the patient being otherwise healthy, or not far advanced in life; if the hæmorrhage is not excessive, or very frequently repeated; if the premonitory and attendant symptoms be not severe; and if the attack be soon followed by relief, and a return of the appetite and digestive functions; if the abdomen and hypochondria be without tenderness, unnatural fulness, or tumour, upon an accurate examination, the prognosis may be favourable. Yet an attack of hæmatemesis should be always considered deserving the utmost attention and skill of the physician.

173. It has been generally stated, that periodic hæmatemesis vicarious of menstruation is unattended by danger; but there are many exceptions to this, arising from circumstances alluded to above (§ 171.). Mr. North met with two cases of this form of the disease which terminated fatally. Upon the whole, therefore, the prognosis ought entirely to depend on the nature of the case, the age of the patient, the state of vital power and vascular action, and especially upon the complication, and the visceral lesions from which the attack proceeds. Dr. Schmidtmann states, that in plethoric patients, and in cases not characterised by much visceral disease, hæmatemesis seldom proved fatal in his practice; and my experience confirms this result. In one case, where it recurred almost daily, a violent attack of gout and the subsequent regimen have prevented its recurrence for years. Hoffmann found five cases fatal out of eight, in those depending upon visceral disease, and broken down powers of the frame. When hæmatemesis assumes or even approaches to the characters constituting the *morbus niger* of the older writers, or indicating structural or malignant disease of the stomach or its orifices, the prognosis must be extremely unfavourable.

174. vi. Treatment.—The *indications* are—1st, to prevent, or to arrest the attack; 2d, subsequently to remove the pathological conditions, on which the hæmorrhage depends.—*A.* The physician has seldom an opportunity of prescribing for the premonitory symptoms of hæmatemesis; but cases sometimes present themselves, in which it is necessary to have recourse to means, when these symptoms recur, *in order to prevent the seizure.*—In these circumstances, a moderate venæsection or cupping over the hypochondria, warm mustard pediluvia, a full dose of calomel, followed by cooling purgatives, cathartic enemata, cooling diaphoretics conjoined with demulcents, and spare farinaceous diet, will generally be efficacious, especially if excited or sthenic action be present. If the powers of life be depressed, instead of the bloodletting, a sinapism, or the warm turpentine epithem, may be applied over the region of the stomach. If the attack is apparently supplemental of hæmorrhoids, or of the catamenia, leeches may be applied around the anus, or near the groins, and aloetic purgatives should follow a full dose of calomel. A blister, or stimulating plaster, may also be applied to the sacrum. In cases of obstructed catamenia, cathartic enemata, with a full dose of spirits of turpentine, may be administered.

175. *B. During the attack*, the treatment must be directed conformably with the principles inculcated above. The question as to the propriety of arresting the hæmorrhage should hardly be entertained in this disease more than in hæmoptysis (§ 136.); for, although the hæmorrhage may sometimes proceed with less risk in the former than in the latter, or even occasionally with advantage; yet, as the quantity of blood thrown up from the stomach is no sure indication of the amount effused, and as the ends likely to be fulfilled by the internal discharge may be more safely attained by treatment, even when circumstances seem most favourable to the allowing of the hæmorrhage to proceed, it will be safer, as a general rule, to employ appropriate means to arrest the attack, and at the same time to accomplish all that the unrestrained effusion could have produced. Even in cases of supplemental or vicarious hæmatemesis, when it is supposed by some advantageous to allow a free discharge, danger may result; for the hæmorrhage may be fatal, although little blood is vomited, the stomach and intestines being filled with the effused fluid.

176. *a.* For hæmatemesis the means of cure are to be selected according to existing pathological conditions. In plethoric and robust persons; in cases depending upon congestion of the liver or spleen, or upon suppressed discharges; and where indications of increased or sthenic action are present—in those circumstances that might indicate the propriety of allowing a copious effusion to take place, it would certainly be improper to arrest the disease at its commencement by the internal use of powerful astringents; but it would be judicious to do so, by removing the pathological states of which the hæmorrhage is the effect, by *venæsection*—copious or repeated, according to circumstances; by *cupping* over the hypochondria; by *purgatives* and cathartic enemata, and by external *derivations*. In these, the more active states of hæmatemesis, *refrigerants*, cooling *diaphoretics*, and the other means advised in similar states of hæmorrhage (§ 35. *et seq.*), may be also employed. Whenever the disease continues, notwithstanding free vascular depletion, and external derivation, there can be no doubt of the propriety of having recourse to the more powerful astringents. In the more active forms, however, a full dose of *calomel*, followed in a few hours by a

purgative draught, and this by a cathartic enema, so as to procure copious alvine evacuations, should precede astringents. When the hæmorrhagic discharge is so copious as to forbid the delay which this practice would occasion, the calomel should be followed, in a very short time, by a full dose of oil of *turpentine*, given on the surface of milk, or of some aromatic water, or of this medicine conjoined with castor oil. If this draught be thrown off the stomach, it should be repeated; and it may be even again preceded by the calomel. Notwithstanding its usual nauseating effect, turpentine is generally retained in hæmatemesis; and it allays the vomiting, by arresting the hæmorrhage. It may be given in any dose, from twenty to thirty drops, every half hour, to half an ounce or more at considerable intervals; it may also be administered in *enemata*, or applied externally in the form of *liniment* (F. 311.) or *epithem*. I have resorted to this practice upwards of twenty years, and am convinced that it is safer and more generally appropriate than any other yet recommended.

177. *b. Cold*, in various modes of application — as in enemata, applied over the epigastrium, iced fluids, lemon and other water ices, taken into the stomach — has been directed in active hæmatemesis, and is often efficacious. But this treatment, as often merely suspends the hæmorrhage, which returns as soon as it is relinquished — sometimes with greater violence. It occasionally also merely checks the vomiting, while the sanguineous effusion still continues. It requires caution and discrimination, and ought not to be confided in alone, when the discharge is very profuse, or the case urgent. Where enlargement, or passive congestion, of the liver or spleen exists, the propriety of this practice is very doubtful. In passive hæmatemesis it is injurious. — *Nitre* (F. 95. 294. 644.) or *muriate of ammonia* (F. 864.) may also be tried in the active states of the disease, as being appropriate to them.

178. *c.* Of the *astringents*, the acetate of lead in large doses, with opium, or with pyroligneous acid, acetate of morphine, and kréosote, is the most efficacious. In the latter combination I have lately seen it successful. The combination mentioned above (§ 131.), as constituting Ruspini's styptic, or the *styptic solutions* prescribed in the appendix (F. 9—12.), or the *astringent balsams* (F. 8—22.), the subnitrate of bismuth or sulphate of zinc, with narcotics, and most of the substances already noticed under this head (§ 40, 41.), will often be of service. In the *passive*, or profuse states of the disease, the more tonic astringents — as the tincture of the muriate of iron, the oil of turpentine with aromatics, the sulphates and sulphuric acid with opium (VOGEL, RULAND, VICAT), and infusion of roses; alum in milk-whey (STRÖM, WILLICH, LINDT, &c.), are generally useful.

179. *d. Emetics*, especially the sulphate of copper, or of zinc, are efficacious in some cases. They have been employed by RICHTER and KECK. — Dr. SHERIDAN states, that both he and his father have resorted to ipecacuanha emetics in hæmatemesis with general success. Very recently the secale cornutum has been recommended; and I have lately employed the *kréosote* in two cases with benefit, and have conjoned it with pyroligneous acid, acetate of lead, and acetate of morphia. — Camphor is mentioned by MARCARD, but it is useful chiefly as an adjunct to other means. The acid formed by the fermentation of buttermilk or whey is noticed by VAN DER HAAR. I have seen it employed in some northern parts of Europe with benefit. Blistering the epigastrium is directed by VOGEL and TOGENBURGHER, and should not be neglected, if the other modes of counter-irritation already noticed (§ 36. 47.) be not adopted. Of the various anodynes, opium has been justly preferred by YOUNG, JONES, ROESCHLAUB, DORFFMÜLLER, and MARCUS; the salts of morphine are now frequently employed, the one most congruous with the other substances prescribed being selected.

180. *C. The Treatment after the attack* is often of greater importance than that of the attack itself. It is chiefly then that the pathological states producing it can be removed. The means of cure should have strict reference to these states (§ 146.), and especially to those of the liver and spleen. There are few cases in which a judicious, regular, and persevering use of mild *purgatives* will not prove serviceable. When there is enlargement or engorgement of the liver, deobstruent and chlologogue aperients, occasional cupping below the right shoulder-blade, and a mild farinaceous diet, are required; calomel, blue pill, PLUMMER's pill, taraxacum, the supertartrate of potash, and the neutral salts, being the most appropriate aperients. When the spleen is enlarged, purgatives are also necessary; but they should either be conjoined or alternated with tonics; and calomel be either laid aside, or be given with caution. In either state, purgative draughts (*Form* 99.), deobstruent liniments (F. 296. 311.) applied over the hypochondria, the nitro-muriatic solution taken internally and used externally, blisters and other external derivatives, will be useful. Cathartic enemata are also serviceable, especially when the bowels are very sluggish, or when the catamenia are interrupted. Most continental writers reprobate the more active purgatives, and venture only upon mild aperients, as rhubarb, manna, tamarinds, &c. When the disease depends chiefly upon relaxation, or irritation of the digestive mucous surface, this caution is very proper; but when the collatitious viscera are chiefly in fault, or when the catamenia are suppressed, the opinion of Dr. BATEMAN, given strongly in favour of the practice recommended by Dr. HAMILTON, is perfectly just.

181. In hæmatemesis vicarious of menstruation, or of hæmorrhoids, purgatives are required; but they should be suited to the peculiarities of the case. When the amenorrhœa is connected with plethora, local depletions, from the groins or tops of the thighs, should be prescribed, and repeated just before the return of the menstrual period, or of the internal hæmorrhage; but when it is connected with adynamia, and a chlorotic or anæmial state of system, the preparations of iron, with myrrh, aloes, or other substances, which circumstances will suggest, should be employed.—In the aged, debilitated, cachectic, and in those addicted to fermented or spirituous liquors, purgatives should be given with caution, those of the mildest kind, in connection with tonics and restoratives, being selected.

182. When the stools continue black some time after hæmatemesis has ceased, this colour

not having arisen from the use of chalybeates, the exudation of blood from the upper parts of the digestive tube — either from the stomach, in so small a quantity as not to excite vomiting, or from the duodenum, or parts in the vicinity — may be inferred. In this case, purgatives, unless those of an astringent or tonic kind, as *Form.* 99, tamarinds, rhubarb, &c. would be injurious. In some prolonged cases of this kind in which I have been consulted, the spirit of turpentine, either in small and repeated doses, or in a full dose, has been most successful; but the external applications just noticed, and means appropriate to the complications which these cases usually present, should not be neglected.

183. *D.* The *regimen* in hæmatemesis does not differ materially from that already recommended. During the continuance of the discharge, total abstinence should be enjoined; but afterwards, mild, mucilaginous liquids, and farinaceous food in small quantity, may be allowed; and the transition to solid and more nutritious diet carefully and gradually conducted. The drink should be cooling and astringent; and appropriate to the states of the digestive organs, especially the liver and spleen. Those prescribed in the *appendix* (F. 591—595. 915, 916.) will be found very generally appropriate. Subsequently, change of air, regular exercise on horseback, and the use of the deobstruent mineral waters, as those of the Beulah Spa, or of Cheltenham, and the factitious Ems or Carlsbad waters at Brighton, ought to be recommended.

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VII. HÆMORRHAGE FROM THE INTESTINES AND MELÆNA.

— Syn. *Intestinal Hæmorrhage*, *Melæna*, Μελαίνα, Μελαίνα Νοῦσος, Ἰλεὸς, *αἱματίτης*, Hippocrates; *Morbus Niger*, Auct. Lat. var.; *Fluxus Splenicus*, Gordon; *Dysenteria Splenica*, Ballonius; *Nigræ Dejectiones*, Schenck; *Secessus Niger*, Hoffmann; *Melæna*, Sauvages, Sagar, Good; *Melænorrhagia*, Swediaur; *Schwartze Krankheit*, *Schwartzer Blutfluss*, Germ.; *Maladie Noire*, Fr.; *Melena*, Ital.

Defin. — *The evacuations from the bowels, containing fluid, grumous, or coagulated blood, or presenting a black or pitchy appearance, with or without vomiting of blood.*

184. I have considered melæna in connection with intestinal hæmorrhage, although the blood, colouring the evacuations, proceeds, perhaps, as frequently from parts above, as from those below, the pylorus: it may even come from the mouth, nares, or fauces, or from the respiratory passages, as I have already shown. The melæna of Hippocrates was the *morbus niger* noticed above, or a variety of hæmatemesis (§ 156.); the application of the term melæna chiefly to black-coloured dejections being of modern date, and I believe justly ascribed to Sauvages. I have viewed it according to this acceptation, and connected it with intestinal hæmorrhage, as it always arises either from this source, or from blood which has passed into the intestines from parts above the pylorus. At the same time, the frequent association of melanoid stools with vomiting of blood, in any of the states above described, has been kept in recollection, and considered as a result of the patholo-

gical conditions, causing the sanguineous effusion either in the stomach, or in the small intestines, or even in parts above the former viscus. — Indeed, melæna may occur not only in any of the circumstances in which hæmatemesis has been shown to supervene, but also in some of those connected with the other hæmorrhages already noticed.— This fact is fully demonstrated by observation, and by the writings specified above, as well as those referred to at the end of this article. Melæna may also appear in the course of cachectic maladies, especially scurvy, purpura, jaundice, &c.; or of adynamic or malignant fevers; or of malignant adventitious productions. — In order to arrange the various conditions in which blood is voided from the bowels, unconnected with hæmorrhoids, I shall notice—1st. *Intestinal hæmorrhage*, the stools not exhibiting the melanoid appearance—2d. *Melæna*, in relation to the sources of hæmorrhage, and to its complications.

185. i. *Intestinal Hæmorrhage, the Stools containing fluid or coagulated Blood, or Simple Intestinal Hæmorrhage—Hæmor. Intestinorum—H. Intestinalis* — occurs, 1st, from interrupted or impeded circulation through the liver; 2d, from congestion and loss of the vital tone of the capillaries of the mucous coat of the intestines; 3d, from ulceration of the intestinal tunics; and, 4th, from inflammatory irritation, or its consequences in these tissues. — *A*. Intestinal hæmorrhage, perhaps, most frequently arises from *impeded circulation through the vena porta*. Even when other pathological states seem to produce it, this may be a concurrent cause: hence, all those lesions of the liver that occasion some impediment to the portal circulation, may be connected with it. It has also been seen complicated with enlargement and induration of the pancreas, with engorgement of the spleen, with tumours about the root of the mesentery, and with enlargement of the mesenteric glands. These latter lesions are, however, rather contingently associated with the hæmorrhage, than concerned in the production of it; whereas, those alterations — as induration, atrophy scirrhus, enlargement, and tubercular or other changes of the liver, which impede or obstruct the circulation of the vena porta, are the efficients of the sanguineous effusion: hence the occurrence of intestinal hæmorrhage, not only in the course of these lesions, but occasionally also in connection with ascites or anasarca; or even with hæmatemesis, or after protracted intermittent or remittent fevers. In these cases, the blood is exuded from the intestinal mucous surface, as first inferred by Glisson; and it is either fluid, grumous, or coagulated, and of a venous or very dark hue, as it is changed by the intestinal gases and secretions, or by its remora in the bowels. The appearance of the blood also varies according to the situation in which it is exuded.

186. *B. Impaired vital tone of the intestinal mucous surface* and of the capillaries supplying it, with congestion or engorgement of those vessels, is also a frequent cause of intestinal hæmorrhage. It is owing to this pathological condition, that blood is discharged from the bowels in purpura in the early course of fevers; in scurvy, and in other cachectic maladies. In fevers, however, there is probably more or less active determination to this part of the economy, especially in those cases in which the hæmorrhage occurs early, or in which it proves critical. When it takes place in the course of petechial, putrid, or malignant fevers, it is generally passive, or entirely dependant upon the pathological conditions under consideration. In these cases, the blood discharged is generally fluid and grumous, and is of a venous or dark hue. When it is evacuated in an early stage of continued fever, or is critical, it is sometimes partially coagulated, or coagulates loosely after it is passed.

187. *C. Ulceration of the intestines frequently occasions hæmorrhage.* — The discharges of blood from the bowels in the advanced or latter stages of dysentery, or chronic diarrhœa, and of continued fever, are often owing to this cause, although they may also proceed, in these stages of fever from the pathological states just mentioned (§ 186.). Intestinal ulceration unattended by fever may also give rise, although rarely, to hæmorrhage. Instances have even occurred in which ulceration had gone on to perforation of the intestine, and adhesion of it to an adjoining viscus, the consequent hæmorrhage proceeding from the ulceration in that viscus. M. Rayer met with a case in which the duodenum and transverse colon were perforated and adherent to the liver, the ulceration in this latter organ having divided two branches of the *vena porta*, and occasioned fatal hæmorrhage.

188. *D. Inflammation of the bowels* is rarely attended by hæmorrhage to a great amount, unless it terminate in ulceration. It sometimes, however, gives rise to discharges of blood, especially when the cæcum or colon is affected; or when portions of the intestines are introsuscepted.—It has been supposed by some writers, that *blood may be discharged from the liver along the ducts*; but of this we have no satisfactory proof; and it is certainly by no means probable that this fluid will be passed from the secreting structure of this organ.

189. The *appearance of the blood* effused from ulcerated vessels, depends upon their seat and size, and upon the nature and stage of the antecedent disease. In far advanced cases of fever or dysentery, the blood is generally fluid, or grumous, and dark. When a large venous branch has been ulcerated, and the hæmorrhage has been very copious, large soft coagula, with much sanguineous serum, are generally passed by stool. In the inflammatory states of intestinal hæmorrhage, as in the early stages of acute dysentery, the blood is fluid, mixed with lymph and mucus, and not in very large quantity, unless ulceration has occurred. The blood discharged furnishes no sure indication as to the seat of the effusion. When, however, it is fluid and unmixed with fæcal matters, the lower bowels are probably the seat. The ancients supposed that if the blood passed before the fæcal matters, it proceeded from the lower parts of the bowels; and that, if it was voided after the fæces, it was effused by the upper parts: but this is no sure criterion. When the hæmorrhage is profuse, the blood acts as a cathartic, occasions severe colicky pains, and is often the only substance evacuated. — When it is very dark and grumous, or consists of small coagula, and of a sanious fluid, it has generally either been long retained, or been poured out in the upper portions of the canal. The appearance, however, very much depends upon the states of

the vascular system, and of the blood itself at the time when the hæmorrhage occurred; for, if it take place in the latter stages of adynamic or malignant fevers, the blood evacuated will be fluid or grumous as well as of a dark hue, or otherwise altered.

190. ii. *Melæna in relation to its sources and complications.*—When blood either flows into the stomach from any of the situations noticed above, or exudes from the internal surface of this viscus in so gradual a manner, or so slight a degree, as not to excite vomiting, but passes the pylorus, and when it is exhaled from the internal surface of the duodenum or small intestines, the evacuations often assume *a perfectly black colour, and tar-like consistence.* In hæmatemesis, the stools frequently have this appearance (§ 163.), owing to the passage of a portion of the extravasated blood into the bowels. This colour is manifestly owing to the admixture of the blood with the biliary and intestinal secretions, and to the action of the acid and gaseous matters contained in the digestive canal; although other explanations have been advanced (§ 192, 193.). Indeed, the evacuations often present, in nearly the same states of constitutional or visceral disease, every variety of colour and appearance, from these just described as constituting melæna, to those resulting from the manifest and abundant presence of pure or venous blood. Evacuations, more or less obviously sanguineous, must be referred either to some one of the sources just noticed, or to the passage of blood from the stomach into the intestines. When the blood comes from parts above the pylorus, the stools generally have more or less of the melanoid character, and there frequently is, or has been, hæmatemesis; but when it proceeds from the parts below, the stools vary with the quantity of blood effused, and other circumstances, and are generally as described above.

191. Hoffmann first, and Morgagni afterwards, attributed melæna to the discharge of blood from the over-distended and ruptured venous capillaries of the intestines, caused by obstruction of the portal circulation and of the spleen. Dr. Cullen considered this to be the usual origin of the disease; but admitted that a true *atrabilis* might be formed, and occasion all the phenomena attending sanguineous melæna. Dr. Good comprised, as a species of this malady, that morbid state which has been called green or black jaundice, and which is very different from melæna, and not necessarily connected with it, although the stools often have a dark green or blackish hue, owing to alteration of the bile, probably from torpor of the liver and prolonged retention of this secretion in the biliary passages. (See art. Jaundice.)

192. Whilst Hoffmann and Cullen attributed the colour of the dejections to the remora and alteration of the blood previous to effusion from the venous capillaries, Portal, Bichat, and others supposed that, in consequence of the impeded or obstructed circulation through the mesenteric and portal veins, the blood was more strongly determined to the extreme arterial capillaries or exhalants of the intestines causing distension of, and effusion from, these capillaries; and that the change in the blood from an arterial to a black hue was produced subsequently to the extravasation by the acids and gases in the digestive canal. — In opposition to these opinions, Dr. Ayre has contended that both melæna and the black variety of hæmatemesis (§ 156.) arise from the passage of blood from the minute ramifications of the *vena porta* in the secreting structure of the liver, consequent upon extreme congestion of these vessels; a very dark blood, instead of bile, passing by the biliary pores into the hepatic ducts, and thence into the duodenum. This hypothesis is, however, not supported by pathological research, and is almost as difficult to refute as to establish. If all cases of melæna were preceded by manifest congestion, and its consequence more or less fulness or enlargement of the liver, the probability of this being the source of melæna would be much stronger than it is; but indications of congestion or of enlargement of this viscus are not uniformly observed.

193. Cases sometimes occur in which a very dark, black, or greenish-black bile is passed, the stools being fluid, or of the consistence of treacle, owing to the circumstance just alluded to, and more fully explained in the article on the Gall-bladder, &c. I have met with such instances connected with chronic disorder of the respiratory and digestive functions. — Cases also are rarely seen in which melanotic matter is voided by stool, owing to the breaking down of tumours or adventitious encysted formations, containing this matter, as admitted by Dr. Marcard and Dr. Goldie, or to the exudation of this matter from the follicles, where it may have been secreted, if, indeed, such an occurrence ever takes place. —In order to distinguish between melæna arising from the *effusion of blood*, or from *black bile*, or from *melanosis*, the stools should be diluted with water, or with a weak solution of soda, when blood will become apparent if the black colour of the evacuations have depended upon this cause.

194. Sauvages and Portal have distinguished as many *varieties of melæna* as there are circumstances in which it presents itself. The latter of these pathologists has illustrated an interesting memoir on the subject, by numerous cases; but the varieties adduced by him are deserving of notice, chiefly as indicating the pathological states on which this morbid condition is contingent, and not any modification of this condition itself; for, as he admits, the matters voided are nearly the same in all. The excretion of black or melanoid stools are, according to M. Portal, met with as follows: — *a.* In the advanced course of continued fever; — *b.* In connection with periodic fevers; — *c.* After strong mental emotions; — *d.* After the suppression or cessation of hæmorrhoids, of the menses, or of any accustomed discharge; — *e.* From irregular, suppressed, or misplaced gout; — *f.* In the course of scurvy, whether depending upon engorgement of the liver and spleen, or upon alteration of the blood, — *g.* In dropsy, owing to the associated visceral disease, or to the abdominal effusion, or to both. This enumeration is, however, defective, inasmuch as the frequent dependence of melæna, — *h.* Upon disease of the liver, spleen, or pancreas, unconnected with scurvy or with dropsy, — *i.* upon carcinomatous, encephaloid, or fungoid productions in some part of the digestive canal, —and, *k.* upon tumours developed in the mesentery, has been overlooked in it.

195. iii. Causes.—The *remote causes* of hæmor-

rhage from the intestines and of melæna, are not materially different from those that occasion *hæmatemesis* (§ 157, 158.). Sedentary occupations; intense or prolonged anxiety, and close application to study or business; full diet and neglect of exercise in the open air; frequent contrarieties; an irritable temper, especially in the melancholic, or sanguineo-melancholic temperament; the intemperate and daily use of spirits or other intoxicating liquors; general debility and cachexia; and the period of life between forty and sixty; are the most common *predisposing* occasions of the disease. Violent mental emotions, particularly fits of anger; great excess in eating or drinking; irritating or drastic purgatives, and acrid poisons; the suppression of sanguineous evacuations or accustomed discharges; the visceral and constitutional maladies just mentioned; and the causes generally productive of hæmorrhage; are the common *exciting* causes of intestinal hæmorrhage.

196. iv. The SYMPTOMS connected with melæna and discharges of blood from the bowels have been partially adverted to (§ 189.). There have commonly been disorder of the digestive canal, as loss of appetite, nausea, or occasional vomiting, and indications of visceral disease, for a considerable time before the attack. A sallow, dusky, waxy, or leaden hue of the countenance; a foul, loaded, dark, or otherwise morbid state of tongue, and tainted breath; a soft or spongy state of gums; fulness, tension, or griping pains of the abdomen, or fulness or enlargement in the hypochondria; oppression or anxiety referred to the præcordia or epigastrium; great debility, faintness, sense of sinking, or syncope; flatulence or nausea; and a tensive or dull pain in one or other of the upper abdominal regions; sometimes vomiting of blood; vertigo and coldness of the extremities; tormina, or colicky pains in the abdomen; and a weak, soft, or open sharp or bounding pulse; usually precede and usher in the discharges of blood by stool, or tar-like evacuations. In some instances, the motions are fœtid or extremely offensive; and in all the exhaustion is great.—In a few cases, the quantity of blood passed from the bowels has been small; yet a fatal termination has occurred, preceded by tormina, and by fulness or tension of the abdomen. In these, the hæmorrhage has been concealed, the bowels being found upon dissection filled by semifluid or coagulated dark blood.

197. v. The DIAGNOSIS of intestinal hæmorrhage and melæna is often difficult; *first*, as respects the seat of effusion; and *secondly*, as regards the resemblance to other affections, particularly biliary disease and hæmorrhoids.—*a*. As to the source of hæmorrhage, the practitioner will be guided in forming his opinion by the circumstances already stated. He will take into consideration the probability of the blood having been poured out from parts above the diaphragm or pylorus, and the existing indications of such visceral disease as usually give rise to sanguineous effusion from the digestive canal.—*a*. If the colour of the stools be caused by black or morbid bile, dilution with water will impart to them a yellowish, greenish, or greenish-yellow hue. If it proceed from the matter of melanosis, dilution will give them neither a bilious nor a sanguineous tint. When the melanoid appearance depends upon blood, the stools are generally offensive, and the sanguineous hue becomes very apparent upon dilution.—*b*. Intestinal hæmorrhage is often mistaken for internal hæmorrhoids; but it is readily distinguished from the latter, by the history of the case; by the tormina and spasmodic pains ushering in the attack; by the action of the bowels being unusual as to the time, and by the attendant sensations and symptoms; by the faintness and exhaustion attending it; by the existing evidence of visceral or constitutional disease; and by the imminent danger in which the patient is manifestly placed. Whereas *hæmorrhoids* are accompanied by the usual tumours, or by prolapsus of the inner coats of the rectum at stool, along with the tumours; and are generally followed by relief of most of the uneasy symptoms, the hæmorrhage occurring chiefly when the patient is passing his usual evacuation, which is commonly more or less fæcal, or unmixed with the blood which is discharged.

198. The *appearances on dissection* are nearly the same as are seen in fatal cases of *hæmatemesis* (§ 165.). The liver and spleen usually present structural change, and occasionally also the mesenteric glands, the pylorus, and pancreas. Congestion, dark-red, brownish, or purplish patches, ulcerations, excoriations, &c. of the digestive mucous membrane, are often observed, especially when the hæmorrhage occurs in an advanced stage of FEVER (§ 51.), in scurvy, or in purpura. In these, the mesenteric and portal veins are very generally loaded with dark, fluid, or thick blood. In some instances, however, the digestive canal is not materially altered; and, in others, it is unusually pale and bloodless. The blood itself is often manifestly changed, the hæmorrhage, as well as the melanoid state of the stools, depending partly upon this circumstance, and partly upon the lost tone of the digestive mucous surface and capillaries. This change obviously obtains in the diseases just mentioned; and in *scorbutic dysentery*, in which discharges of dark blood frequently take place from both the small and large intestines.

199. vi. PROGNOSIS.—Intestinal hæmorrhage and melæna are generally attended by danger; but much depends upon the pathological states of which they are consequences, upon the amount of the discharge, and the consequent exhaustion. When the effusion takes place early in fever or dysentery, is moderate, or is likely to prove critical, a more favourable opinion may be given; but with some reservation nevertheless. When sanguineous, or black stools, are consequent upon hæmatemesis, or upon hæmorrhage from parts above the diaphragm or pylorus, the prognosis will have strict reference to the related circumstances, and especially to the parts from which the blood appears to have directly proceeded; and will be either favourable or unfavourable accordingly; but, unless when the blood has come from the lungs, in the manner noticed above (§ 99.), or in some alarming states of hæmatemesis, or when there are very obvious visceral disease, and great exhaustion, the danger is much less than in true intestinal hæmorrhage and melæna.

200. vii. TREATMENT.—The stools ought to be attentively examined, in those diseases especially in which intestinal hæmorrhage and melæna are most likely to occur, and still more particularly

whenever faintness or exhaustion after a motion is complained of. For want of this precaution, hæmorrhage from the bowels has been often overlooked, and even fatal syncope has supervened, soon after the patient has been allowed to get upon the night-chair. In most circumstances of disease, in which this form of hæmorrhage is apt to occur, a bed-pan ought to be used, and the sitting or erect posture should not be assumed, until it is allowed by the physician.

201. *A.* The ancients supposed that blood effused in the intestines soon becomes putrescent; and they, therefore, prescribed purgatives to carry it off, and to prevent its injurious effects upon the system. This view of the matter is not without truth; but purgatives ought to be employed with caution, as they are apt to increase the hæmorrhagic state of the bowels, if they be of an irritating or relaxing kind. *Rhubarb,* with *ipecacuanha* and the *hydrargyrum cum cretâ,* and spirits of *turpentine* with *castor oil,* are the most safe, appropriate, and efficient purgatives in this disease; but they will often require to be assisted by mucilaginous enemata, or by injections containing these oils. When the liver is much affected, occasional doses of *calomel* may be given with rhubarb, or with opium or some other narcotic, as circumstances may suggest. The spirit of turpentine was prescribed first by Dr. Adair for this form of hæmorrhage, and afterwards by Dr. Brooke in the same year that it was employed by myself in a different quarter of the globe. I have since always resorted to it, and in some very hopeless cases. In a very severe case of melæna, which I saw in 1823, with Mr. Churchill, this medicine was successfully administered after the most powerful astringents had failed. It has likewise been recommended by Dr. W. Nicholl and Dr. Elliotson. It exerts either an astringent, or a purgative effect chiefly, or both, according to the dose and the mode of exhibiting it (§ 176.). It is also very beneficially applied over the abdomen, in the form of liniment, or of warm epithem or fomentation.

202. The other means of cure should entirely depend upon the related pathological states, and upon the nature of the malady, on which this is contingent. If it occur in the course of *putro-adynamic* FEVER (§ 491.), the means there advised should be employed; if in the progress of *scurvy* or *purpura,* the remedies directed for these diseases, in addition to those now suggested, ought to be prescribed. If intestinal hæmorrhage depend upon structural change of the liver or spleen, the treatment is not materially different from that advised for *hæmatemesis,* in similar circumstances; but when the discharge is profuse, astringents must, in the first instance, be decidedly employed. Of these, the oleum terebinthinæ; the acetate of lead with opium, or with acetic acid and morphine; the gallic, citric, or other vegetable acids; the mineral acids and the metallic salts; the chlorides, especially the chloride of lime; kreosote, and the most powerful vegetable astringents should be preferred. — When nervous symptoms are present, camphor may be conjoined with either of these, or with opium; and, when the crasis of the blood, as well as the vital cohesion of the tissues, are manifestly impaired, the chlorides, or the muriate of ammonia, or the nitrate or the chlorate of potash, &c., may be given with such of the astringents as are congruous with them.

203. *B.* The *diet* and *regimen* should be even more rigidly attended to than in hæmatemesis. The former ought to consist chiefly of farinaceous and mucilaginous substances. Fruits and slops are generally prejudicial. Vermicelli, or rice boiled to a pulp, and moistened with beef tea, or veal broth, is generally suitable. Perfect quiet of body and mind, and the recumbent position, ought to be maintained. Wine is sometimes necessary, especially in the circumstances requiring the use of opium. Lime-water, alum-whey, lemonade, imperial, or any of the beverages prescribed in the Appendix (F. 588. *et seq.*), may be employed as the patient's drink. When blood has entirely disappeared from the stools, attention ought to be carefully directed to the excretions and the digestive functions, and the strength restored by mild and light nourishment, the quantity of which should be gradually increased to a very moderate amount. The causes, and pathological states on which this affection depends, ought to receive attention, as the removal or mitigation of these is the most sure means of preventing a recurrence of the attack. When convalescence is not retarded by disease of the liver, then wine with seltzer-water, the preparations of bark, and various tonic astringents may be allowed; but the bowels ought at the same time to be duly regulated. (See also *the Treatment of Hæmatemesis* (§ 174.)

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VIII. Hæmorrhage from the Urinary Organs.

—Syn. *Hæmaturia* (from αἷμα, blood, and οὐρέω, to urinate.), Auct. var; *Sanguis in Urina,* Celsus; *Mictus Cruentus,* Sydenham, Hoffmann, and Juncker; *Mictus Sanguineus, Hæmorrhagia ex Viis Urinariis, Hæmorrhœa Vium Urinariarum,* Swediaur; *Blutharnen,* Germ.; *Pisement de Sang, Hématurie,* Fr.; *Orina de Sangue, Ematuria,* Ital.; *Bloody Urine, Hæmorrhage from the urinary passages.*

Defin. — *The urine, containing or consisting of a fluid, grumous, or partially coagulated blood, the colour varying from red to brown or black,* *sometimes with small fibrinous coagula, the patient generally complaining of uneasy sensations in the region of the kidneys or bladder.*

204. i. The CAUSES of hæmaturia are—*external injuries* on the loins, hypogastrium or perinæum; falls, or concussions of the trunk; prolonged or severe exercise on horseback; riding in carriages over a rough or broken pavement; violent muscular exertions; — *Internal irritants*, as calculi formed in the kidneys or bladder, and acrid substances taken into the stomach, absorbed into the blood, and carried to the kidneys, as turpentine, cantharides, savine, and various other medicines; —and whatever inflames, or causes congestion of the urinary organs, as the application of cold, the suppression of accustomed discharges, &c. — Hæmaturia may also be produced by the concurrent influence of plethora, venereal excesses, violent fits of passion, &c.; but the most common causes are organic changes implicating the kidneys or bladder; general cachexia, as scurvy and purpura; malignant and exanthematous fevers; and even still more common are calculous formations and the other internal irritants specified above.—This disease is most frequent in males, in persons advanced in life and in the aged; in plethoric habits and sanguineous or irritable temperaments; in the scrofulous and calculous diathesis; in those who pass an indolent and luxurious life, and who are addicted to venereal indulgences, and to the intemperate use of intoxicating liquors.

205. *a. Idiopathic hæmaturia* is extremely rare. CULLEN states that he never met with it. J. P. FRANK rarely saw it. Unless when caused by cantharides or turpentine, it is certainly very seldom observed; and even when thus induced the hæmorrhage is generally scanty, and the consequence of inflammatory irritation. Indeed, hæmaturia is often merely a symptom of inflammation of either the kidneys or urinary bladder, the quantity of blood effused being small. — *b. Supplemental hæmaturia*, or that which is vicarious of the catamenia, or of hæmorrhoids, is equally rare, although its occurrence has been much insisted upon by foreign writers; and it is extremely probable that organic lesion is more or less concerned in the production even of this variety. CHOPPART, however, mentions an instance of hæmaturia consequent upon irregular menstruation, in which the urinary organs presented no change after death.— *c. Critical hæmaturia* is seldom observed, although FORESTUS, ETTMÜLLER, AMATUS LUSITANUS, MARCELLUS DONATUS, ZACUTUS LUSITANUS, HOFFMANN, JUNCKER, CHOPPART, LATOUR, &c., insist on its importance during inflammatory fevers, and in plethoric persons. They also consider that, of all critical hæmorrhages, it should be the least interfered with. When hæmaturia is actually critical, it seems to depend upon a similar state of local action and of vascular fulness, general or local, to that which obtains in the more idiopathic and vicarious states of the disease. — It is chiefly, therefore, as a *symptom* of previous disease, local or constitutional, or even of both, but especially of urinary calculi, that hæmaturia is met with in practice.

206. ii. The DESCRIPTION of hæmaturia comprises — 1st. The appearances of the urine and of the blood contained in it; 2d. The symptoms attending this morbid state of urinary excretion, and their relation to the seat of hæmorrhage; and, 3d. The pathological states of which hæmaturia is the consequence.— *A*. The *urine* may contain much or little blood; or the fluid evacuated from the bladder may be almost entirely blood. Its colour may be either red, or brownish red, or nearly black or inky. Sometimes the urine is passed *guttatim* with pain and scalding; and with a constant or frequent recurrence of the desire to empty the bladder, although but little or even no urine is contained in it. At others, the blood and urine are retained in large quantity, efforts at evacuation being ineffectual, owing to coagula obstructing the outlet from the bladder or being lodged in the urethra. Even when the obstacle is removed by a sound or catheter, the urine often presents a bloody, sanguineous, or chocolate appearance for several days, although the hæmorrhage may have ceased, and is sometimes extremely offensive from the decomposition of the clots retained in the bladder, or from the action of the urine upon them. Occasionally this fluid is grumous, very dark, or even black, or contains a number of small brown coagula. In some cases, fibrinous substances of various forms and sizes are evacuated, consisting of the fibrine of the effused blood, moulded or changed by the parts through which they have passed. In others, a stringy or gelatinous substance, with dark coagula, or black grumous matter, is observed in the urine; and occasionally mucous, muco-puriform, or gravelly matters are also found.

207. *B*. The *symptoms* of hæmaturia vary with the seat of hæmorrhage. (*a*). When the *kidneys* are the parts chiefly affected, the attack is usually preceded or attended by chills or rigors; by coldness of the extremities, and particularly of the hands; by deep-seated pain, or a sense of weight, or of tension, or of heat in the loins; by general lassitude; and often by anxiety, or colicky pains in the abdomen; by frequent desire to pass the urine; sometimes by numbness in one or both thighs, and pain in the course of the ureters, or by nausea or retchings. If cantharides or savine have been taken, a burning heat is felt in the urinary passages, with priapism, scalding, and pain on discharging the urine, &c. — (*b*). When the *bladder* is the seat of hæmorrhage, a frequent desire, or great difficulty, to excrete the urine; tenesmus, or pain or heat about the anus; a sense of tension or of warmth, with itching above or behind the pubis, or of dragging in this situation; pain or aching in the perineum, frequently with febrile symptoms or nausea, and constipation of the bowels, are complained of. The severity of the local symptoms, as well as the state of constitutional disorder, vary extremely, according to the grades of vital power and of sthenic or asthenic vascular action, and to the organic changes or nature of the local irritation of which the hæmorrhage is a consequence.

208. The above symptoms, especially when they precede the attack, indicate inflammatory irritation or active congestion of the urinary organs. But sometimes the hæmorrhage takes place suddenly, and in great abundance, without any precursory sign. In some cases, also, the symptoms are very obscure. In most of these, however, it will be found that the blood comes from the kidneys, and that its effusion is caused by calculi in these organs. Even when the blood is discharged

from the kidneys, the symptoms may be most severe in the region of the bladder, owing to the irritation and interrupted excretion of the effused blood, or even independently of these circumstances. Indeed the symptoms have not infrequently been referred to the sound or least affected organ, whether the kidneys or bladder. More commonly, however, they indicate the seat of hæmorrhage with much precision, when duly investigated.— Dr. PROUT very justly remarks, that, when the blood is equally diffused through the urine, it generally proceeds from the *kidneys;* and that when it mostly comes away in greater or less quantity at the termination only of the urinary discharge, the urine having previously flowed off nearly pure, it is effused from the *bladder*. In the former case, also, coagulated fibrine in the shape of worms, moulded in the ureter, and subsequently washed out by the urine, are not infrequently met with. When these appear, the diagnosis is unequivocal, especially when they are consequent upon the symptoms above referred to the kidneys, or upon other evidence of the existence of calculi in these organs. On the contrary, when there are symptoms of stone in the bladder, or of other disease of this viscus or of the prostate gland, indications of renal disorder not being present, the bladder may be considered the source of hæmorrhage; and this inference may be likewise drawn, if severe pain above or behind the pubis be complained of; if the bladder become suddenly distended; if the passage of urine be interrupted or entirely obstructed, and if other signs of coagula in the bladder be present, although the external discharge may be small.— When the blood passes, *guttatim*, without urine, it manifestly comes from the *urethra*. It may, however, proceed from the upper parts of the urethra, and flow back into the bladder, and be voided with the urine. Rigors or horripilations not infrequently attend hæmorrhage from this, as well as from other parts of the urinary passages.

209. *Hæmorrhage into the bladder*, from either the kidneys or ureters, or the upper part of the urethra, but more especially from the *parietes of the bladder itself*, may be followed by *coagulation of the blood* in this viscus. This is not unlikely to take place, if the effusion be sudden and copious; and whenever it does, the patient experiences great suffering. When the coagulum is large, it often causes retention of urine; and when it is small, it sometimes becomes the nucleus of calculous formations. The principal *indications of the existence of coagula* in the bladder are pain, distention, and weight, with tenderness or tension above and behind the pubis, with a sense of dragging in this situation, and of aching in the perineum, preceded or attended by the excretion of a small quantity of pure or recently effused blood by the urethra, and frequent desire to pass the urine. When this secretion is retained, distension of the bladder so as to occasion a tumour above the pubis, with tenderness and tension of the hypogastrium and other distressing symptoms are also present. If the urine present, after a scanty discharge of recently effused blood, and more or less of the above symptoms, a brown or chocolate appearance, or deposits a heavy dark sediment, and if frequent efforts to urinate continue, the evidence of coagula in the bladder is still stronger (§ 208.).

210. *C. Duration, &c.*— Hæmaturia may continue a few minutes only, or many hours, or even days. It may *remit* or *intermit*, or recur at short or very distant intervals. It may be even *periodic*, the attack returning more or less frequently. Periodic hæmaturia is not uncommon in miasmatous climates, and it is, although rarely, even seen in this country amongst those who have been exposed to malaria, or have resided long in warm climates, or suffered from periodic fevers. In a case of this kind detailed by Dr. ELLIOTSON, hæmaturia accompanied the cold fit of ague, and was cured, along with the ague, by the sulphate of quinine. Hæmaturia may be also periodic when it is vicarious of the catamenia or of hæmorrhoids. When it depends upon calculi in the urinary organs, its recurrence may be expected until the cause is removed; when it proceeds from malignant or other organic disease of these parts, it is most commonly persistent, recurring, or severe, or even fatal in its consequences.

211. *D. The Pathological states of which hæmaturia is generally a consequence* have been already noticed, but some of them require more particular mention. — *a*. When the hæmorrhage is consequent upon *inflammatory irritation*, the symptoms referrible to either the kidneys or bladder are well marked, and more or less symptomatic or irritative fever is often present. Fibrinous substances are also generally found in the urine, and the discharge of blood is seldom considerable, and never excessive. Hæmaturia, from inflammatory action of the inner coats of the bladder, is stated by M. RENOULT to have been very prevalent among the French troops in Egypt. It was characterised by pain in the region of this viscus, extending to the glans penis, with frequent and urgent desire to pass urine, the last drops often consisting of pure blood, and their discharge being attended by very acute pain.— *b*. Very nearly the same phenomena are observed when the complaint depends upon the irritation of *calculi in the kidneys or bladder*. When these exist in the latter viscus, mucous or muco-puriform matter, or a gelatinous lymph, is sometimes found, along with more or less blood, in the urine. — *c*. The irritation of a *calculus in the ureter* may occasion hæmaturia; but the symptoms, as respects either the appearances of the urine, or the seat of uneasiness, may not be different from those already mentioned. In some cases, the pain felt in the situation or course of the ureter; the sense of weight, uneasiness or pain in the lumbar region of the same side; and the numbness or cramps of the thigh or leg of that side, will indicate the source of disorder.— *d*. The hæmaturia which occurs in the course of typhoid or putro-adynamic fevers, of scurvy, and of purpura generally arises from *relaxation of the extreme vessels* of the kidneys, and of the urinary mucous surfaces, in connection *with alteration of the blood itself*. In these, the blood is sometimes effused in considerable quantity; but it is never coagulated, although it is occasionally grumous. It is more intimately mixed with the urine than in other circumstances; the excreted fluid being generally dark, and either offensive or soon becoming so. — *e*. Hæmaturia may also arise from *malignant disease* of the *kidneys, bladder*, or *prostate gland*, especially *fungoid* or *encephaloid*

productions in these organs. In some cases arising from this cause, the hæmorrhage has been excessive, the urinary bladder being distended by fluid and coagulated blood, especially when the effusion has taken place from this viscus, or from the prostate gland. An interesting instance of hæmorrhage into the bladder from fungoid tumours connected with the prostate, where it was necessary to perform the high operation in order to remove large and firm coagula that had formed, is recorded by Mr. COPLAND HUTCHISON (*Lond. Med. Repos.* vol. xxii. p. 128)—In some cases of malignant disease of the urinary organs, the colouring parts of the blood appear as a reddish sediment in the urine.—*f. Softening of the kidneys, or the internal tunics of the bladder* may be followed by hæmaturia, without being suspected during the life of the patient; but these lesions are very rare.—*g. Ulceration of the inner coats of the bladder* very rarely occurs, unless as a consequence of *simple cystitis*, or of cystitis associated with calculi in this viscus; or without very manifest symptoms of these diseases. In these cases, the hæmaturia is preceded by such symptoms for a longer or shorter period, and the urine has been loaded by mucous or muco-puriform matter. — *h. A varicose state of the veins*, particularly about the neck of the bladder, has been noticed by several writers as a cause of hæmaturia (*Hæmorrhoides vesicæ*, auct. var.), and by some in connection with the gouty diathesis; but this change is very seldom observed. — *i. Other organic lesions* of the kidneys have been mentioned as causes of hæmaturia; but they can be merely suspected during life, unless they be attended by, or consist of, tumours of the organ, and give rise to pain in the loins and numbness of the thigh of the same side, with the appearances of the urine already noticed (§ 208.); and even then, their nature will seldom be fully ascertained.

212. iii. DIAGNOSIS. The urine may present appearances very closely resembling hæmaturia and yet be perfectly free from blood. The internal use of various vegetable substances, especially the prickly pear (*Cactus opuntia*), beet-root, madder, sorrel, logwood, &c., will give a *red colour* to the urine, that will be distinguished with great difficulty from that produced by blood. The reddish pink hue of the urine in some inflammatory diseases, will hardly be confounded with hæmaturia.— The dark, *black, or inky state of the urine*, noticed by several writers, may arise either from the presence of blood, or from the principal elements of bile being excreted by the kidneys with the urine, whilst the liver is obstructed or incapable of performing its functions, as in jaundice. Cases in which *black urine* has been voided, are recorded by RHODIUS, SCHENCK, SAILLENS, BONET, COWPER, RIEDLIN, BARTHOLIN, LOMMIUS, STOLL, NICOLAI, MARCET, E. THOMPSON and myself. GALEAZZI met with it complicated with hæmatemesis. BONET, after recording a case in which the urine had the appearance of ink, states, that he has observed this in hypochondriasis, where it has occasionally proved critical. In a case treated by me fifteen years ago, a perfectly black sediment was deposited after the urine had stood some time. This condition of the urine may be produced either in the way just stated, or in the manner I have explained when detailing the case just alluded to (*Lond. Med. Repos.* vol. xviii. p. 161.) — by supposing the arterial capillaries and secerning apparatus of the kidneys to be relaxed to a degree sufficient to allow red globules of the blood to escape with the excreted urine, the black colour arising from the action of an acid, or of the saline ingredients of the urine on these globules.

213. When blood is present in the urine in any considerable quantity, a portion of it sinks to the bottom of the vessel, and the transparency of the secretion is disturbed. The reddish pink urine without blood is generally clear. A mixture of urine and blood tinges a piece of white rag dipped into it of a red colour. Dr. WATSON observes that, upon boiling urine containing blood, a brown coagulum will be formed, and that the fluid part will regain the natural colour of urine. When the black hue depends upon the presence of bile, it passes to a yellowish or greenish tint upon dilution with water; if it proceeds from blood, a reddish colour becomes apparent, especially if a little subcarbonate of soda be added.

214. iv. PROGNOSIS.—The prognosis must depend chiefly upon the pathological states producing the hæmaturia. If these consist principally of inflammatory action or irritation, or of active congestion, a severe, although not necessarily a dangerous, disease is indicated. If there be evidence of calculi in the kidneys or bladder, a nearly similar opinion may be formed, but much will depend upon the circumstances of the case, and the states of associated disorder, particularly of these organs. If hæmaturia occur in aged persons and broken down constitutions, or if there be reason to infer the existence of malignant or serious organic change in any part of the urinary passages, the prognosis must be very unfavourable. The amount of hæmorrhage is in itself rarely fatal, although the retention of coagula in the bladder is always dangerous, and often fatal, from the consequences which result, particularly as respects the excretion of urine. When hæmaturia appears in the course of adynamic, continued or exanthematic fevers, or in purpura, &c. an unfavourable opinion of the result should be entertained.

215. v. TREATMENT. — *a.* When bloody urine proceeds from inflammatory irritation or active congestion, or is supplemental of some other sanguineous discharge, and especially when it is attended by severe pain or symptomatic fever, or increased vascular action, *bloodletting*, and particularly cupping on the loins, or perineum, according to the seat of the chief affection, should be practised. In these, as well as in other circumstances, demulcent diluents, and oleaginous or mild aperients, are more or less beneficial. When acrid substances have caused the complaint, these are especially required; and the almond emulsion, the gums, the decoction of althæa, the infusion of linseed, &c. may be abundantly exhibited, either alone or with small doses of camphor, or with paregoric elixir. When the hæmorrhage is induced by calculi, local depletions, and demulcents, conjoined with the opiates or other anodynes, or these latter, either with the alkaline subcarbonates, or with diluted muriatic acid, according to the state of the urine, the warm bath, and emollient enemata, will generally be of service.

216. *b.* When hæmaturia presents a passive character — when it is attended by great debility or vascular asthenia, or supervenes in the course of

the maladies already mentioned, camphor should be given in considerable doses, with small quantities of opium or acetate of morphia. In such cases, also, the the tincture of the muriate of iron; or the balsams or terebinthinates, particularly the balsam of Peru, copaiba, the Canadian balsam; or the spirits of turpentine in small doses; or the infusion of uva ursi, or of the diosma crenata (F. 231.) may be employed, and conjoined with opiates or other anodynes according to circumstances. Frank advises cold clysters with vinegar, and tonic astringents internally. Dr. Prout found an obstinate case of profuse hæmaturia yield at last to a combination of colchicum with uva ursi. Where sabulous or calculous formations are concerned in the production of the hæmorrhage, or when the hæmaturia occurs in the gouty diathesis, this combination, either alone or with the alkaline subcarbonates, seems very appropriate. When the hæmorrhage is so very profuse as to require to be immediately arrested, dry cupping on the loins, the warm bath, or warm pediluvia, spirits of turpentine, given internally and administered in enemata, the superacetate of lead with opium, kréosote, and the other active astringents already mentioned (§ 40. 178.) are the most to be depended upon.

217. *c.* If *coagula* form in the bladder, the serious consequences they usually induce should be prevented as much as possible by breaking them down by means of a catheter; and by injections of tepid water, or other emollient fluids, containing a small quantity of the subcarbonate of soda, or of potash. This practice has been advised by Desault, J. P. Frank, Home, Larrey, Howship, and others; and should not be delayed, or partially or negligently adopted.

218. *d.* There have been *some other means* recommended by writers on the disease, but few of them are deserving of notice. Cælius Aurelianus advised bloodletting, the injection of astringent fluids into the bladder, and the application of cold epithems to the pubis; but considered diuretics to be injurious. Sydenham recommended depletion, and astringents with narcotics; Buchave and Loeffler, frequent doses of ipecacuanha; Gooch large doses of opium; Moyle, Schoenfeld and others, the terebinthinates; Bishop, the decoction of the leaves of the Persian almond; and J. P. Faber, the application of lead or of its preparations over the region of the kidneys.

219. *e.* The *regimen* during and after hæmaturia should be directed in conformity with the seat of the disease, and with the principles already developed. The *diet* should be chiefly farinaceous and mucilaginous; and the beverages emollient and slightly astringent. The waters of Bath, or those of Ems and Carlsbad, or of Seltzers and Geilnau, or the factitious waters prepared at at Brighton, may be tried. When the bowels require assistance, oleaginous purgatives, especially castor and olive oil, are upon the whole the most appropriate, and may be freely administered in enemata. The patient should avoid riding on horseback or in a carriage; but, if the latter cannot be dispensed with, an air-cushion should be used.

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IX. Hæmorrhage from the Uterus. — Syn. *Sanguinis Stillicidium ab Utero*, Ballonius. *Hæmorrhagia Uterina*, Juncker, Good. *Hæm. Uteri*, Hoffmann. *Menorrhagia*, Sauvages, Vogel, Cullen, &c. *Fluor Uterini Sanguinis*, Boerhaave. *Hysterorrhagia sanguinea*, Swediaur. *Metrorrhagia*, Sagar, Ploucquet, J. P. Frank. *Metro-hæmorrhagia*, Auctor. *Blutgang*, *Mutterblutfluss*, *Gebärmutterblutfluss*, Germ. *Perte de Sang des Femmes*, *Perte Rouge*, *Perte Uterine*, Fr. *Perdita di Sangue*, Ital. *Uterine Hæmorrhage*, *Flooding*.

220. Defin. — *Discharge of blood from the vessels of the Uterus, independent of the menstrual evacuation.*

221. From this definition it will appear, that *Menorrhagia*, or excessive menstruation, should not be confounded with *Metro-hæmorrhagia*, or uterine hæmorrhage. But it should not be overlooked that the former often passes into the latter. Menorrhagia is treated of in the *Article* Menstruation: hæmorrhage from the uterus only, legitimately falls under consideration at this place. *Metrorrhagia* (from *μήτρα*, the womb, and *ῥήγνυμαι*, I break forth) has been very generally employed to denote this disease; but it is evident that *αἷμα* should be interposed, in order to convey the idea attached to this term, and that the name, *Metro-hæmorrhagia* should be preferred.—

The division of this subject, adopted by M. DUGES and some others, although considered unnecessary by M. DESORMEAUX, may be here followed with advantage. I shall, therefore, consider uterine hæmorrhage as it occurs — 1st. Before puberty; 2d. During nubility, or before the cessation of the menses: — 3d. At the critical period of life, and during old age; and, 4th. In connection with the puerperal states, or during pregnancy, and after delivery.

222. i. Hæmorrhage may take place from the uterus, or in a slight degree from the vulva, at any period *previously to puberty;* but this very rarely occurs, unless as a consequence of masturbation, or of premature sexual connection, or of genital excitement. The destructive vice, masturbation, exists much more frequently amongst young females, and is acquired at an earlier age than is generally supposed even by medical men; children of the age even of two or three years, sometimes acquiring it from nurse-maids, or from older children. Two or three instances of this have accidentally come to my knowledge. Both at the infirmary for children, and in private practice, cases of hæmorrhage from the female genitals occurring at irregular periods previously to puberty, have come before me; as well as instances of premature menstruation, the discharge recurring after monthly intervals; and, in every case, a strict investigation has led to the inference as to the cause already stated. Precocious menstruation is much more rare, than uterine hæmorrhage before puberty; the latter, may be distinguished from the former, by the attendant injury to the general health, and loss of the healthy look, and complexion: whereas, the former is accompanied by a more rapid growth of the frame, and by other signs of puberty, as the developement of the mammæ, &c.

223. ii. From the 12th to the 16th year, in our climate, the female sexual organs are developed so far as to give rise to the menstrual discharge. But the occurrence of this discharge, at or for some time after the earlier of these years, is not an indication of these organs being capable of performing all their functions, inasmuch as impregnation is rarely effected before fourteen years of age. *Metro-hæmorrhagia, occurring after puberty,* independently of the puerperal states, or menorrhagia proceeding so far as to amount to a true hæmorrhage, is liable to recurrence, at irregular or regular periods. When the hæmorrhage is slight, and returns at the monthly periods, the observations offered when treating of *excessive* MENSTRUATION are altogether applicable. But when it is very large, or of frequent, or of habitual recurrence, it is most exhausting and injurious to the system, although it may be entirely independent of any structural lesion. A female may experience only one attack, arising from excessive determination of blood to the uterus, caused by various exciting causes: and, even when the attacks recur, they will be much influenced by diet and regimen. Whenever they return, whether at monthly, at irregular, or at short intervals, or whether the discharge be continued or remittent, especially if the female have been or is married, or has had children, some morbid structure in the uterus should be dreaded, and a careful examination made *per vaginam.* Uterine hæmorrhage at this epoch, unconnected with impregnation and the puerperal states is, either, 1st. *Sthenic* or *active* — depending upon determination of blood to, or upon inflammatory irritation of, the uterus; or, 2d. *Asthenic* or *passive,* arising from impaired tone of the uterine vessels and parietes; or, 3d. *Symptomatic* of organic lesion. But before the phenomena ushering in or attending these states of the disease are described, the causes which induce them may be detailed.

224. *A. Causes.* — *a.* The *predisposing causes* which are more especially concerned in the production of this form of uterine hæmorrhage, are the epochs at which the menses first appear and at which they altogether cease; the menstrual periods themselves; general or local plethora; excessive sensibility of the uterus, arising either from original conformation, or from inordinate sexual excitement, or masturbation; frequent or difficult child-bearing, or abortions, especially if they have succeeded each other rapidly; constriction of the abdomen by tight corsets (MAURICEAU, RANOË); too much warmth applied to the lower parts of the trunk and thighs; very hot seasons; the habitual use of exciting liquors, of rich and high-seasoned dishes; and a frequent recourse to warm baths. These predispose chiefly to the more *active* states of uterine hæmorrhage, but the following favour the occurrence of the more *passive* forms; — especially weakness of constitution, general debility, and cachexia; the lymphatic temperament; imperfect or unwholesome nourishment; chronic or excessive discharges, particularly prolonged lactation; the depressing passions, as grief, sadness, anxiety, &c.; the abuse of relaxing beverages, &c.

225. *b.* The *exciting causes* are, stimulation of the vascular system generally, or of the uterine organs in particular, by the use of hot baths, of intoxicating liquors, of acrid purgatives, or of emmenagogues, and by excessive sexual indulgence; riding on horseback, or in an uneasy carriage; prolonged dancing; running, or walking too far; lifting heavy weights, and physical exertions of any kind; shocks or concussions of the trunk; falls on the thighs or hips; excitation or irritation of the sexual organs, by injections, pessaries, or suppositories; the more violent mental emotions, as anger, fright, &c. SENNERT refers to a case in which it was induced by a stimulating pessary; and obstruction or retardation of the menses may be the cause of hæmorrhage, independently of any means being used to remove this obstruction, as shown by DESORMEAUX and LOCOCK. It is, also, not unusual for metro-hæmorrhagia to occur within the first fortnight after marriage, especially when this rite has been performed shortly before the period of female indisposition. It has been supposed that sexual congress during this period is apt to induce an attack of this disease. Certain causes, also, may occasion it, by affecting related organs, and thereby acting sympathetically upon the uterus. VAN-DEN-BOSCH adduces instances of it having been produced by worms in the intestines. I have seen it favoured, if not excited, by ascarides. — STOLL and FINCKE observed uterine hæmorrhage unusually prevalent during the bilious inflammatory fever of 1778. GENDRON, CONRADI, STRACK, and HÖPFNER, remarked it occasionally to attend gastric and bilious diseases; and ZIE-

gert conceived that it is not infrequently induced by irritating matters lodged in the bowels. The irritation of the mammæ during suckling causes it, in some females. A passive and severe form of the disease has been observed to attend upon epidemics of an adynamic or malignant character; and upon scurvy, and some other cachectic maladies.

226. But however influential and numerous may be the occasional causes of metro-hæmorrhagia, they do not so frequently produce it as *morbid formations in the uterus,* particularly fibrous and other tumours seated in the parietes of the organ, or under the internal lining, polypous productions, hydatids, moles, ulcerations, carcinoma, &c. It may also attend inversion, prolapsus, or other displacements of the womb; or may accompany inflammatory congestion of this viscus, or chronic metritis; and it may even prove a critical evacuation in these affections.

227. *B. Symptoms and Progress.* — These vary with the causes of the hæmorrhage. If the occasional cause be violent, it sometimes follows instantly upon the action of such cause; but, more commonly, a certain interval is observed, during which indications of congestion of the uterine vessels may be observed. In some such cases the attack is so severe as to place the patient's life in jeopardy, particularly if it have occurred during the menstrual period. This form, which may be called accidental uterine hæmorrhage, does not ordinarily occur; but that, on the contrary, which follows the operation of the predisposing causes, is slowly established, and often by a successive increase or duration, or by the more frequent return of the menstrual discharge.

228. The precursory symptoms of an attack sometimes consist only of uneasiness, or colicky pains, as on the accession of the menses; but more frequently the discharge is preceded by some of the following signs — by enlargement, tenderness, or pain of the breasts; tension at the hypochondria; a sense of fulness, weight, heat, throbbing, or pain in the hypogastric and inguinal regions; constipation, or tenesmus with occasional abdominal pains; general lassitude, and a frequent, soft or open pulse. To these succeed pallor of the face, coldness of the extremities, horripilations, the *cutis anserina,* and heat or pruritus of the genitals, followed by the sanguineous discharge, which removes most of the foregoing ailments; but, when the loss of blood has become great for her strength, the patient complains of a sense of sinking or weakness at the epigastrium; and when it is excessive, the lips and face are pallid, the pulse fails, and the eyes grow dim; noises are heard in the ears, and deafness supervenes; respiration becomes quick, laborious or irregular; and faintness, full syncope, convulsions, or even death may take place. But the symptoms do not always follow this course. In some cases, the discharge is less rapid or excessive; coagula form in the vagina; and these restrain the hæmorrhage, and are afterwards expelled by voluntary efforts, before the severer symptoms occur. In delicate or nervous females, convulsions or other nervous symptoms may appear early, or before much blood is lost. Violent headach, especially towards the occiput, is a very common attendant, and generally continues long after the hæmorrhage has ceased. If the discharge, without being excessive and rapid, recurs frequently, or is moderate but continued, or merely remits, the patient complains of pain and sinking at the stomach, of extreme langour and exhaustion; the pallor is extreme, the eyes are surrounded by a livid circle; the ankles become œdematous, especially towards night; various nervous symptoms appear, and serous effusions into the shut cavities occasionally occur. Metro-hæmorrhagia may appear at first in a sthenic or acute form, and become passive or asthenic from its continuance or recurrence; the effused blood being frequently thin, pale, or dark. It may continue long, or return often, without giving rise to any severe ailment, or merely to some of the foregoing symptoms in a slight degree. When it occurs at the menstrual period, it is often replaced by a leucorrhæal discharge.

229. *C. Diagnosis.* — The disease is so manifest as to the extent of the sanguineous discharge, and the effects thereby produced upon the system, that its diagnosis is a matter of no difficulty. But it is not so easy to distinguish between the causes which produce it, and the states of the œconomy which are induced by it. Yet this distinction, as M. Desormeaux contends, should be made, as it directs to a judicious method of cure, and it will generally be made without great difficulty if the attention of the practitioner be directed to the subject, and if the various circumstances causing the attack, and the several phenomena attending it, be passed in review. As to uterine hæmorrhages dependent upon organic lesions of the uterus, it may be remarked, that most frequently they are not passive, even when they proceed from ulceration; but that they are generally preceded by circumstances indicating sanguineous congestion, active determination, or an hæmorrhagic effort.

230. iii. Uterine hæmorrhage, *about the period of the cessation of the catamenia, or subsequently to this period,* is not infrequent. Menstruation, then, often assumes an irregular form — disappearing for months, and returning in a profuse or truly hæmorrhagic form. Generally this circumstance is unattended by material risk. But if the discharge be very great, or occurs often, or if it appears after the age of fifty or after the catamenia have ceased for many months, or for two or three years or more, there is sufficient cause for alarm, and serious disease of the uterus should be suspected. Such returns of youth, with which aged females sometimes console themselves, are rarely unattended by some one of the structural changes already enumerated (§ 226.). I was consulted, however, long ago in a case of a female above sixty, and otherwise in good health, who had returns of uterine hæmorrhage at nearly monthly intervals. No disease was detected upon examination; and she is now alive and well, and in her 74th year. I was very recently called to a lady 47 years of age who had been subject to frequent returns of uterine hæmorrhage during two years, and who was labouring under a dysenteric attack when I saw her. This latter was soon subdued, when the hæmorrhage, and the cause of it, became objects of attention. An examination was made, and a hard fibrous tumour was found in the os uteri. It was soon afterwards thrown off; but the hæmorrhage re-

turned and symptomatic irritative fever continued. An examination was made some days afterwards, and another tumour was found passing into the vagina. This, which was distinct from the former in structure and form, came away soon afterwards, and the recovery was progressive and complete. In this case, the tumours were most probably developed beneath the internal lining of the uterus, and thrown off, in the course of the treatment which was adopted for the arrest of the hæmorrhage.

231. The *symptoms* of uterine hæmorrhage at this advanced epoch of life, are not different from those already described (§ 227.). But they are more generally caused by organic lesions of the womb, than uterine hæmorrhage at the preceding epoch, and complicated with the symptoms which more particularly appertain to the associated lesion. Indeed this constitutes the chief malady; the hæmorrhage being only the contingent, but often the more immediately dangerous, or most alarming, occurrence. The consideration, however, of these associated lesions cannot be entered upon at this place. It is fully entertained in the article upon *diseases of the* UTERUS.

232. IV. OF PUERPERAL UTERINE HÆMORRHAGE. — Under this head is comprised hæmorrhage *during pregnancy or parturition, and after delivery.* — The changes that then take place in the uterus, and particularly soon after parturition, sufficiently account for the frequency of metro-hæmorrhagia, at these periods. — *During pregnancy* there is an actual increase of the vitality as well as of the bulk of the uterus — a state of orgasm of which vital activity and vascular determination are the chief elements. Hence the active nature of the hæmorrhages that take place from it at this epoch. Besides, this viscus contains an organised and living body, presenting intimate relations with it, and opposing certain of the circumstances which favour sanguineous effusions from it. The vascular connection between the uterus and placenta becoming more developed as pregnancy advances, it follows that the detachment of a portion or the whole of the placenta or ovum will give rise to a more profuse hæmorrhage in the advanced, than in the earlier months of this period; but as soon as the uterus has thrown off its contents, and in proportion as the uterus contracts, the disposition to effusion will become less, until it altogether ceases. Hæmorrhage during pregnancy or after delivery may proceed, either from the numerous minute decidual vessels, which connect the ovum to the internal surface of the uterus, and are necessarily torn when the ovum is either partially or altogether separated, or from the semilunar openings seen in the inner surface of the uterus, when the placenta is removed, or from both sources. The opinions of pathologists are divided on this subject; but as long as the exact offices of these openings are undetermined, no precise inference can be arrived at as to this question. However it may be settled, the treatment to be adopted is unaffected by it, inasmuch as the fact is unquestioned, that it is to the partial or entire detachment of the placenta from the uterus, that uterine hæmorrhage, at an advanced period of pregnancy, is generally to be attributed.

233. Previously to the consideration of true puerperal uterine hæmorrhage, the disputed topic as to *the source of the loss of blood* occasionally observed in the earlier months of pregnancy may be briefly referred to. This species of discharge has been considered as a true menstrual evacuation from that part of the uterus, to which the ovum has not become particularly attached by means of the placenta, and that it escapes through the imperfectly closed *os uteri*, owing to the softness of the mucous or albuminous secretion which fills it. But if this were the case, we may reasonably infer, that it would also occur in many instances, in which the os uteri presents a complete obstacle to its exit, and in which it would accumulate and assume the form of internal hæmorrhage. Having met with two or three instances in which I was enabled to inquire into the phenomena attending this kind of discharge, I am of opinion, that it proceeds from the cervix and os uteri, external to the limits to which the deciduous membrane extends; and that it depends upon the active vascular determination, of which the uterus is the seat during the early months of pregnancy. In some cases, this discharge takes place only once, about the usual monthly period, in others oftener; it is generally slight, and of short duration; seldom considerable. It often passes into a somewhat profuse leucorrhœa; and this circumstance indicates that it proceeds from the same seat, and depends upon a nearly similar state of vascular action, as that secretion.

234. *Puerperal uterine hæmorrhage* is somewhat different as to its causes, prognosis, and indications of cure, in the different periods in which it occurs: — 1st. It may appear *before the sixth month of Pregnancy*, and it is then generally active, or dependent upon vascular determination, or a *molimen hæmorrhagicum;* sometimes mechanical, or owing to a local injury or violence, which has occasioned the partial or general separation of the attachments of the fœtus, and connected with *abortion*, the risk of which it announces. — 2d. *During the three or four last months of pregnancy* it may, in some cases, be connected with the same causes, or changes; but it more frequently depends upon the attachment of the placenta upon, or very near to, the mouth of the womb. 3d. It is chiefly to this cause, and to some others about to be noticed, that hæmorrhage takes place *during parturition;* — and, 4th. It is to imperfect contraction of the uterus, that its occurrence *after delivery* is to be attributed.

235. Besides these divisions, there is another to which some attention should be directed. This is into *internal*, and *external*, uterine hæmorrhage. The former often takes place after delivery at the full time, and after abortions; but its occurence during pregnancy, and whilst the fœtus and its envelopes fill the uterus, has been disputed. M. DESORMEAUX observes that, in internal hæmorrhage during pregnancy, the blood is effused either between the uterus and membranes, or within the membranes. When seated between the ovum and uterus it depends upon the same causes as external hæmorrhage, but certain circumstances have opposed the discharge of the blood. ALBINUS found the placenta detached, and a large quantity of coagulated blood interposed between it and the uterus; its circum-

ference being firmly adherent, and preventing the escape of the blood. **Baudelocque** and **Desormeaux** believe that, in rare instances, the external discharge may be prevented by the head of the fœtus pressing upon the neck of the uterus, or by a clot of blood plugging up the os uteri. Hæmorrhage occurring within the membranes is strictly speaking *fœtal;* as the blood in such cases comes from the vessels of the fœtus, and generally from a rupture of the umbilical vessels. These forms of internal hæmorrhage (during pregnancy) have been denied by M. **Duges** and some others. But the facts adduced by **Albinus**, **De la Motte**, **Levret**, and **Baudelocque** indicate, that it actually occurs but in rare instances. M. **Desormeaux** even enumerates the symptoms by which its existence may be recognised. He states that it may be inferred from the presence of the usual symptoms of hæmorrhage without the external discharge; by a sense of weight and of painful tension in the region of the uterus; and by the sensible augmentation of the volume of this organ, generally in an unequal or lobulated form, owing to the effusion occurring exteriorly to the membranes, and being confined to one part. It is obvious, however, that these indications cannot be fully depended upon.

236. *A. Uterine hæmorrhage previous to the sixth month* of pregnancy arises in the manner already stated, from the *causes* enumerated above (§ 224.), or from means resorted to in order to procure abortion, or from some of the other causes adduced in the *article* **Abortion**. At this period, a certain interval elapses between the action of the cause and the commencement of the discharge, during which, symptoms indicating sanguineous congestion of, or determination to, the uterus are manifested; and when a suitable treatment is then adopted, these symptoms disappear, and hæmorrhage is prevented. The causes of hæmorrhage, during this part of pregnancy, are never more influential than at the usual periods at which the catamenia would have returned if the patient had not been pregnant; and it is during these months, that general or local plethora, and mental emotions, causes so frequently concerned in the production of uterine hæmorrhage, seem to be most injurious.

237. *B. a. Hæmorrhage at, or subsequently to, the sixth month* is generally owing to the attachment of the placenta on the neck of the uterus, and commonly appears without any obvious remote or exciting cause. It is generally moderate at first, and either subsides spontaneously or after treatment. But it soon returns as before, is more abundant, continues longer, and does not yield so soon to treatment. Hæmorrhage from this attachment of the placenta generally goes on increasing until the child is destroyed, or delivery is effected. Yet it occasionally commences with great violence, and instantly threatens the life of the female. Sometimes it does not occur until near the natural period of delivery; or it appears much earlier, and returns not until then. M. **Duges** considers that, when the placenta is attached only partially over the neck of the uterus, or laterally, the dilatation of the neck will occasion only a slight or very partial detachment of it, and a moderate hæmorrhage, admitting of being permanently arrested; but that, when it passes over a great portion of the *cervix* and *os uteri*, the discharge, although moderate at first, will return, with greater violence and frequency, and will at last continue until the uterus is emptied, or until the mother and child perish. And, where the life of the female is preserved, the great loss of blood leaves her in a state of anæmia and exhaustion, attended with severe headachs, sleeplessness, or palpitations, and other sympathetic affections.

238. The period of utero-gestation at which this variety of hæmorrhage takes place, coincides with that at which the relation of the placenta with the cervix and os uteri, to which it is attached, is disturbed, and which is usually from the sixth to the eighth month. But it may occur early in the fifth, or in the course of the ninth. The discharge appears without any obvious cause; but it sometimes is hastened by some effort or physical shock, and is even occasionally attended by a sensation leading the patient to infer, that something had given way in the uterine region. During labour-pains the discharge of blood is always increased, whilst it is diminished by the contraction of the uterus in other cases; and, as parturition proceeds, the placenta occasionally passes before the fœtus, which generally dies if this process is not speedily completed. Upon examining the os uteri in this form of hæmorrhage, it is found thicker and softer than usual, and its orifice is occupied either partially or altogether by a soft spongy body, which must not be mistaken for a coagulum of blood. If a coagulum be detected in this situation, it ought not to be disturbed, lest the hæmorrhage be renewed.

239. *b.* But hæmorrhage from the uterus may occur in the latter months of pregnancy, although the *placenta is implanted on the upper part of the uterus.* This, however, is comparatively rare. The blood may be effused in small quantity, and may be chiefly internal. When it is in considerable quantity, and the placenta is separated to some extent, uterine contractions are exerted, terminating in delivery, or in a renewal of the hæmorrhage, from which the patient may expire. This form of hæmorrhage may occur without any premonitory sign; but it is more frequently preceded by a sense of uneasiness or weight, or of pain in the region of the uterus, and other signs of congestion or of active determination. It is most frequently caused by external injury, fright, and concussions of the trunk.

240. *C. During delivery*, a small or moderate quantity of blood is lost, but is rarely pure, being always accompanied with water and mucus. When true hæmorrhage occurs, it is generally owing to the detachment of the placenta by the unequal contractions of the uterus, or to the situation of the placenta near or upon the *os uteri*. In rarer cases, it proceeds from rupture of the parietes of the womb; or from rupture of the umbilical cord. In cases of plurality of children, hæmorrhage may supervene in the intervals between the delivery of each. It is then chiefly owing to effusion from the part of the uterus where the placenta of the first child is inserted, owing to a partial or complete detachment of it. When flooding occurs in the first stage of labour, the discharge always ceases when

the uterus contracts, and returns during the intervals between the pains.

241. *D. Hæmorrhage after Delivery.* — This may occur previously to the expulsion of the placenta or subsequently. *a.* When it takes place *before the placenta is thrown off*, it is usually owing to one or other of the following circumstances, or at least it is met with in connection with them. 1st. To torpor of the organ; — 2d. To a partial detachment of one part of the placenta and undue adhesion of another; — 3d. To irregular or spasmodic contraction of the womb. It scarcely ever proceeds from the chord, unless in cases of twins, when it may possibly take place. But it may arise from laceration of the uterus or vagina. — *b. After the expulsion of the placenta*, flooding generally proceeds from imperfect contraction, or torpor, of the womb. It may, however, be connected with inversion, or with retention of a portion of the placenta, or of the membranes, in the cavity or mouth of the organ; and in a few cases it appears to depend upon active determination of blood to the uterine vessels, as insisted upon by GOOCH, after some Continental writers. These states of the uterus, especially flaccidity, may be readily inferred from a careful examination and observation of the symptoms. Whether the hæmorrhage takes place before or after the expulsion of the placenta, it may be either *internal* or *external*.

242. *c. Internal uterine hæmorrhage*, after delivery, may thus take place before the expulsion of the placenta or afterwards, or it may be favoured by the retention of the placenta or of the membranes, or of both, partly in the neck and mouth of the womb, and partly in the vagina. That this form of hæmorrhage should be early detected and remedied, is of the utmost importance. The uterus upon external examination will be found soft, roundish, and increasing in bulk, so as often to approach, or even to pass, the umbilicus. It may even ultimately attain the dimensions it had just possessed, and be followed by the death of the female, or by a prolonged and difficult recovery. Whenever pallor of the countenance and lips, vertigo or swimmings, noises in the ears, a sense of sinking, nausea, or retching; a very rapid and irregular pulse, a quick anxious or gasping respiration; restlessness, jactitation, &c. supervene, whilst the lochia are not more than usually abundant, or are diminished, internal hæmorrhage to a most dangerous extent may be inferred; and a careful examination of the abdomen ought to be made. In order to ascertain the cause of the retention of the effused blood, the expulsion of all the placenta and membranes should be proved; as well as the presence or absence of a portion of these, or of coagula, in the os uteri and vagina. At the same time, distension of the uterus by effused blood must not be confounded with the existence of another child in the womb, or with meteorismus, or with a distended urinary bladder, either of which cannot be mistaken if attention be directed to it, and to the existence of the symptoms just enumerated.

243. *d. External flooding* after delivery of both the fœtus and placenta is not to be mistaken, if due attention be paid the patient; for the blood may collect and coagulate in the centre of the bed, in the depression produced by her weight, and be overlooked, if she be exhausted and carelessly attended. This variety of hæmorrhage occurs in every degree of severity, and is either gradual, draining, and continued; or rapid, violent, alarming and even speedily fatal; or remittent, intermittent, &c. It is accompanied with all the symptoms already noticed in connection with this (§ 228.), and other severe forms of hæmorrhage, and is followed by most of the phenomena caused by extreme losses of BLOOD, as described in that *Article* (§ 53. *et seq.*). Whilst *internal* or *concealed* hæmorrhage is almost uniformly dependent upon a total want of uterine action, the *external* form arises either from that state, or from imperfect, irregular, or transient contractions, and from either of these states in connection with vascular determination to the womb. When slight, continued or draining, it may be kept up by the retention of a portion of the placenta or membranes, or of fibrinous coagula, in the uterus. It is important to keep in recollection these pathological states, as upon them the appropriate use of remedies entirely depends.

244. ii. PROGNOSIS. — The circumstances which indicate a favourable or unfavourable result in other hæmorrhages, also apply to the different forms of uterine hæmorrhage. But the condition of the uterus, in both the unimpregnated and puerperal states, and the period of gestation, with various other related circumstances, must be considered in reference to particular cases. *A.* In *uterine hæmorrhage occurring independently of the puerperal states*, the prognosis should entirely depend upon the nature of the causes, the states of the uterus, the severity of the symptoms, the duration of the disease, and the strength of the patient. When it is induced by occasional causes of a passing or accidental nature, danger will arise only from the quantity of the discharge. If it proceed from causes which have modified the constitution, and endowed it with a tendency to hæmorrhage, or occasioned an habitual discharge, the treatment will generally prove difficult or unsatisfactory. That variety, which occurs in girls at the periods of puberty, ceases spontaneously as the menses become regular; and that which takes place at the critical age of woman, also disappears with the monthly indispositions, if the womb be free from organic changes. When it proceeds from these changes, the prognosis should be guarded, even when circumstances admit of it not being unfavourable. In these cases danger may arise from the hæmorrhage, as well as from the nature of the lesion of the uterus; but more frequently this latter is the chief source of risk, unless where the morbid formation admits of removal, as in the case of *polypus uteri*. (See *art.* UTERUS.)

245. *B. Uterine hæmorrhage during the puerperal states* is often one of the most alarming and speedily fatal of the maladies peculiar to females. According to PUZOS, it is rarely fatal before the fifth month of gestation. Experience has shown the justice of the remark; yet I have seen life in imminent peril at this early period. Flooding is the more dangerous the nearer it occurs to the natural period of delivery, whether previously or subsequently to this process. As respects the fœtus, however, the chances of its preservation diminish with the length of the time to the period

of birth.—Hæmorrhage from insertion of the placenta on the neck or mouth of the womb, is always attended by danger, varying with the violence of the discharge, and requires the speedy acceleration of parturition to save either the mother or child. *Internal*, is much more unfavourable than *external*, hæmorrhage. The latter, when slight, is often its own cure, by removing plethora, or vascular determination. But the former has frequently proceeded to a dangerous or even fatal extent, before the medical attendant is made aware of its accession. Moreover, in order to arrest it, the uterus must be emptied of its contents; and this often increases the exhaustion, or causes a further loss of blood. In either internal or external hæmorrhage, when the pulse becomes very frequent (above 120), small, thready, or irregular; the breathing suspirious or gasping; the motions convulsive, with shudderings, or jactitation; or the sinking and anxiety distressing; and if full syncope supervene, notwithstanding the supine posture and low position of the head, great danger exists, and the patient may either suddenly expire, or recover slowly and with great difficulty.

246. iii. TREATMENT.—*A.* Hæmorrhage from the uterus *previously to puberty* seldom requires more than moral treatment. — *B.* When it *occurs at or after puberty, independently of the puerperal states* — 1st, The occasional causes should be avoided; — 2d, Means appropriate to the pathological states producing it, ought to be used for its arrest chiefly when it is excessive; — and, 3d, Measures should be directed to prevent its return when the nature of the case indicates that a return is probable. The fulfilment of the *first* intention will often accomplish the *third*, and will generally promote more or less the success of the *second*. — *a.* In a great majority of instances, the hæmorrhage is the result of active determination or of congestion; and it is often connected with a chronic or slight grade of inflammatory action. In these circumstances, the discharge ought not to be arrested by astringents or tonics; for I have seen this kind of interference convert a slight and salutary hæmorrhage into a severe or chronic inflammation. Yet it is not always judicious to allow the discharge to continue, inasmuch as the uterus might thereby contract a disposition to hæmorrhage, or to some other disease. It will be better to attack at once the pathological conditions — general or local plethora, or local vascular excitement—upon which the disease depends, by general or local depletions, by internal refrigerants, by a strictly antiphlogistic diet and regimen, and by repose of mind and body. The patient should be placed in a cool and airy apartment, and preserve the horizontal posture on a bed or couch which is neither too soft, nor too warm. The nitrate of potash, vegetable acids, and acidulous fruits should be given from time to time; and the circulation may be equalised by cooling diaphoretics, as ipecacuanha, hyoscyamus, and nitre, with small doses of camphor. Ipecacuanha, in free or frequent doses, is one of the best remedies that can be prescribed; and when bilious colluvies require to be removed, it may be given so as to procure full vomiting, as advised by STOLL, FINKE and others. Constipation ought always to be prevented; but heating and irritating cathartics ought to be withheld. The tartrate of potash, or of potash and soda; tamarinds, or the supertartrate of potash with the confection of senna, the inspissated juice of the sambucus, &c., or any of the aperient electuaries in the *Appendix* (F. 82. 96. 98.), and mild laxative enemata are the most appropriate. *Derivatives*, as warm manuluvia, are occasionally of use, and are advised by HOFFMANN and LORDAT. DUGES and some French practitioners direct the application of cupping glasses on the mammæ. When bloodletting has been employed, or is not indicated, *dry cupping* over the loins or sacrum may be resorted to. *Opium* and other narcotics are most beneficial in the form of DOVER's powder. It is only in the more urgent cases, that cold either externally, or in lavements, and other means about to be recommended, need be prescribed.

247. *b.* If the hæmorrhage has passed into a *chronic*, or into a *passive* state, the foregoing treatment is no longer appropriate. Tonics and astringents are then required; especially the preparations of catechu, or those conjoined with opium as directed by WENDELSTATT; the muriated tincture of iron; the terebinthinates and balsams; the superacetate of lead and opium; the sulphate of alumina or the metallic sulphates; and the other astringents already recommended for other asthenic or profuse hæmorrhages (§ 40–45). It is in the passive form of the disease that the *secale cornutum* seems to be most serviceable. It may be given in decoction or powder. DE WEDEKIND and SAUTER advise the exhibition of the *Juniperus Sabina*, in doses of from ten to twenty grains of the powder, thrice daily, but it should be exhibited with caution, and its effects attentively watched.

248. *c.* In *delicate or nervous females*, in whom metro-hæmorrhage soon assumes a passive character, and gives rise to various nervous affections, an early recourse to restoratives, astringents, and sedatives, is often necessary. *Camphor*, with nitrate of potash and opium or hyoscyamus, in conserve of roses; DOVER's powder with catechu; the infusion of roses with sulphuric acid and anodynes; the balsam of Peru or of Tolu, in the form of pills, with magnesia, or powdered rhubarb, or with oxide of zinc, and small doses of opium, according to the peculiarities of the case, may be severally employed.

249. *d.* If the hæmorrhage continue, or become excessive, or occasion exhaustion, or any alarming symptom, the use of cold externally and internally has been very generally recommended. HOFFMANN and LEAKE advise cold fluids to be taken in large quantity; PEZOLD, very cold clysters, and the external application of pounded ice to the hypogastrium; numerous writers, various cold epithems, on the loins, tops of the thighs, vulva, &c.: and many recent authors, the cold affusion on these situations. But these require much discrimination. They are not always appropriate in the passive states of the disease, and they are serviceable chiefly when the active form has become excessive or dangerous. Yet I have seen recourse to them fail, in some instances, and productive of injury, in others. If resorted to prematurely, they may be followed by inflammatory action in the uterus, peritoneum, &c., or by severe rheumatic attacks.

I have, therefore, had recourse, in extreme or prolonged cases, to the spirits of turpentine, either in a draught, or in an enema, or in the form of epithem or fomentation applied over the hypogastrium; and always with success. — This practice was first adopted by me in 1819, in metro-hæmorrhagia occurring after delivery, and has been pursued by me in other hæmorrhages, whenever it was considered advisable speedily to arrest them. In 1820, I publicly recommended this treatment; and I know, that it has succeeded with those who were thus led to employ it.

250. *e.* When the hæmorrhage is *symptomatic of organic disease of the uterus*, it is generally prolonged, or returns frequently, and is injurious more from this circumstance, than from its violence at any particular time. It is also often remittent, or periodic, the intervals varying in different cases; but the discharge generally subsides spontaneously after local plethora or determination is removed, and returns again as soon as the organic change has established vascular fluxion, or congestion in the uterine organs. Although merely a symptom of the existing organic lesion; yet its frequent recurrence, and the consequent anæmia, sinking, and serious nervous symptoms, require that it should receive the chief attention in the treatment; — and that tonics, astringents, restoratives and anodynes, should be liberally, but appropriately, exhibited. When the hæmorrhage is symptomatic of ulceration, or of malignant disease, injections, *per vaginam*, with the solutions of the *chlorides*, particularly of the chloride of lime, or with pyroligneous vinegar, or with solutions of *kreosote* should be resorted to, in addition to the means just mentioned. When it is occasioned by a polypus, or by a tumour on which a ligature may be placed, then this ought to be applied.

251. The *third intention*, viz., to *prevent the return of metro-hæmorrhagia*, need hardly be enforced in the accidental form of the disease; but it is of the first importance in the constitutional, habitual, or periodic states. In order to fulfil it, the remote causes ought to be removed or avoided; and the patient be placed upon a strict diet and regimen. Every source of local and of general and mental irritation should be shunned. The horizontal posture ought to be retained as long as possible for some time previously to, and during, the discharge; and, in the intervals only, gentle exercise should be taken in the open air. The food ought to consist chiefly of mucilaginous and farinaceous articles, of easy digestion; and asses' milk, with Seltzer water, as advised by Hoffmann may be used both as a beverage, and as an article of diet. The patient should be kept cool; she ought to sleep on a mattrass, rise early, or remove to a couch: and, if she be married, lie apart from her husband. If the hæmorrhage be active and dependent chiefly upon general or local plethora, a small bloodletting from the arm may be resorted to just before the expected accession of the hæmorrhage; or small and frequent doses of ipecacuanha, so as to occasion either nausea or vomiting, may be tried as directed by Hoffmann, Ranoë, Holst, Dalberg, and others. — In cases depending chiefly upon debility, the preparations of cinchona, of iron, or of other tonics; the cold plunge or shower bath and salt-water bath; the mineral waters of Tunbridge or of Bath; the factitious waters of Pyrmont, Spa, or of Seltzer, and a light diet; will be of great service. When the recurrence of the discharge is owing to organic lesion, cold bathing is inappropriate, and the mineral waters just mentioned require to be tried with circumspection. Those of Ems of Carlsbad, or of Marienbad, however, will often be employed with benefit.

252. C. *Treatment of puerperal metro-hæmorrhagia.* — *a. Previously to the sixth month*, uterine hæmorrhage should be treated altogether as described in the article Abortion. If the fœtus and membranes have entirely come away, and the discharge continue from a passive state of the uterus, the exhibition of spirit of turpentine in an enema, will rarely fail of arresting it; but the practitioner should ascertain that no part of the placenta or membranes remain in the uterus or vagina, causing irritation and prolonging the discharge. When the uterus is thus inactive, after abortions, the *secale cornutum* or *borax*, or the spirits of turpentine may likewise be exhibited to procure its contraction.

253. Desormeaux considers that hæmorrhage may take place in the early months of pregnancy, so as partially to detach the placenta, but that the clot that is formed between it and the uterus will often arrest the hæmorrhage and adhesion of the detached portion subsequently occur; and he refers to a case by Noorthwyk, in support of his opinion. On this ground he advises having recourse, at the earlier periods of gestation, to *plugging* the vagina, as recommended by Leroux, after bleeding and the usual means of arresting the hæmorrhage have failed. (See Abortion, § 26. et seq.) At these periods, the uterus is still more or less unyielding, and the resistance to further effusion is considerable. But, in slight attacks, or at the commencement, the obstacle afforded by the plug may hasten the complete detachment of the ovum, by favouring the accumulation of blood between it and the uterus; and either a copious internal hæmorrhage may thereby be produced, or the ovum, being detached, may be prevented by it from being thrown off, and be retained for a long period, keeping up irritation and hæmorrhage, or a continued draining with occasional exacerbations, or a putrid discharge. Indeed, this occurrence is not rare in the early months, independently of the plug, although the use of it before the expulsion of the ovum, and when the os uteri is soft or yielding, is more likely to occasion than to prevent it. When, however, the os uteri is firm, and the discharge copious, it is often of service; but it is chiefly after the ovum is expelled, in cases of flooding before the fifth month, that plugging is most efficacious, if efficiently employed. Care should be taken that the plug do not press injuriously upon the urethra: Mr. Ingleby directs that it should remain undisturbed for twenty-four hours or longer; but the supervention of internal hæmorrhage should be kept in view, and the case carefully watched.

254. When the blood escapes in small quantity only, and there are no pains present, and no disposition in the os uteri to dilate, the constitutional powers being unimpaired, an attempt should be made to prevent a return of the dis-

charge, by the means already described both in this article and in that on ABORTION. But, as Dr. R. LEE justly remarks, where the flooding is profuse at first, or is renewed with violence, in spite of efforts to check it, the continuance of pregnancy to the full period cannot be expected, and it will be of no avail to take blood from the arm, and to administer internal remedies with any other view than with that of arresting the discharge, and thereby averting danger. In these circumstances the speedy evacuation of the uterus is the chief indication, as the slightest cause may reproduce the hæmorrhage, in an alarming manner, whilst the partially detached ovum remains. But, in the early months of pregnancy, this intention is not so easily accomplished, as at later periods. *Puncturing* the membranes in order to excite the uterus is advised by RIGBY, R. LEE, and MERRIMAN; but, before the fifth or sixth month, this may not be easily performed; and, until the sixth or seventh, the hand, however small it may be, will not readily be admitted into the uterus. The *ergot of rye* has been recommended by NEALE, NEGRI, RYAN, and numerous American as well as European practitioners, in order to procure the contraction of the womb in such cases. It may be given in powder, or in decoction, with three or four drops of the oleum Pulegii, as advised by Dr. RYAN. I have prescribed it successfully both alone and with from ten to twenty grains of the sub-borate of soda. An enema, containing an ounce or an ounce and a half of spirit of turpentine may be thrown up, if these fail. A judicious recourse to these means will generally supersede the use of the plug or puncturing the membranes, the propriety of which latter before the sixth month is denied by Mr. INGLEBY and some others. Wherever, in such cases, the end can be obtained by the use of medicine, recourse to any operation, however trifling, should be avoided. Instances, however, may occur about the fifth or sixth month, in which perforating the membranes is required, in addition to the other means just advised. The cold affusion or the dashing of a wet napkin against the external parts, or the application of the turpentine epithem on the hypogastrium, may be also resorted to, when the case becomes urgent.

255. *b.* When in the *third or fourth months*, the hæmorrhage is continued, draining or remittent, a merely partial evacuation of the uterus should be suspected, more especially if the discharge become offensive; or, if the fœtus with the whole of the appendages have been ascertained to have come away, a flaccid or relaxed state of the uterus may be inferred. In such cases, a careful examination will discover one or other of these states, which will generally be removed by the medical means just advised, and especially by the exhibition of the spirit of turpentine by the mouth, or in enemata. The recommendation of Drs. HAIGHTON and BLUNDELL to inject the uterus with astringent fluids, if at all advisable, is most likely to be serviceable in cases where a portion of the ovum has been retained in the uterus, and is passing into decomposition.

256. *c. Hæmorrhage after the sixth month*, although occurring most frequently from attachment of the placenta upon the *cervix uteri*, may also take place when this does not exist. In this stage of pregnancy, as well as at earlier periods, if the discharge be in small quantity or moderate — if it have not proceeded with much rapidity — if it stop soon — if no large clots be formed in the vagina — if the cervix have its usual feel, showing that the placenta is not attached there, and that no large coagula are retained in the os uteri — if the child be still alive — if there be no indication of the accession of labour — and if the discharge become pale and watery — we may conclude, with Dr. BURNS, that the full period of gestation may be reached. In this case, the treatment already directed in active hæmorrhage ought to be adopted. But where the effusion is profuse, or continues, and the strength of the patient is impaired by it, the fœtal membranes should be punctured, the liquor amnii evacuated, and the uterus roused to action by the means just advised (§ 254.), aided by frictions over the hypogastrium, and by dilation of the os and cervix uteri.

257. *d. When the placenta is attached over the cervix uteri*, as evinced, on a careful examination, by its fibrous vascular structure; by its adhering to one part of the uterus, and being separated at another; by the renewal of the hæmorrhage during labour pains; and by its occurrence without any obvious exciting cause, the utmost decision and dexterity on the part of the practitioner is required. If flooding occur to an alarming extent in the seventh or eighth months, an examination should be instantly made, and while the blood is actually flowing. In some cases, where a small portion of the placenta lies over the os uteri, coagula may close the orifices of the bleeding vessels, and the patient may go on to the full time. In these, the hæmorrhage is seldom very profuse; and this result cannot be expected. The general recurrence and increased violence of the effusion, until the patient either expires, or is delivered by art, demand that a rule of practice should be laid down; and the rule first devised by LEVRET, and now generally received, is *the speedy performance of artificial delivery*. Dr. R. LEE states that he has seen only one case of flooding from the position of the placenta, followed by recovery, without artificial delivery; and, in order to accomplish this, he recommends the hand to be passed into the vagina, as in turning, without waiting for the pains of labour, or the dilatation of the os uteri, and carried steadily forward through the os, in a conical form, between the uterus and placenta, at the part where their separation has taken place. The membranes are then to be ruptured, and an inferior extremity of the child brought down, and the infant and placenta slowly extracted. The hand, however, should not be forcibly introduced whilst the os uteri is rigid and undilatable. Until it becomes soft, the flow of blood should be checked by the recumbent posture, by cold applications and the *plug*. But this latter ought not to be inserted when the os uteri is soft and dilatable. In the rigid state of this part, in hæmorrhage from this cause, it will command the effusion, until the operation of turning can be safely performed; but, as soon as this may be attempted, it becomes inadmissible.

258. *e. If flooding occur during the first stage of labour*, at the full time, the membranes should be immediately ruptured, as recommended by CLEMENT, PUZOS, KOK, RIGBY, BAUDE-

locque, Denman, Merriman, D. Davis, Blundell, Lee, Ramsbotham, Sweatman, and others; but if the discharge should still continue, and the pains become more and more feeble, and the patient exhausted, delivery must be accomplished by turning, by the forceps, or even by embryotomy, according to the circumstances of the case. In less imminent cases, the ergot of rye and other means already mentioned (§ 254.) may be tried before recourse be had to these operations. Mr. Ingleby, however, considers that many of this description of cases are occasioned by the injudicious use of the ergot; but, when it is employed for the arrest of the discharge, and for the purpose of procuring uterine action, this objection does not apply either to it, or to other means intended to exert a similar operation. After the liquor amnii has escaped, the os uteri still remaining rigid, there are objections to the exhibition of the ergot: and in such a case, plugging the vagina, as advised by Burns, Dewees, Capuron, Gardien, Davis, &c., may be resorted to, with the aid of friction and moderate pressure on the abdomen in order to increase uterine action. The possible occurrence, however, of internal hæmorrhage should not be overlooked; and if this take place, the still more active interference just mentioned must not be delayed. But the plug should not supersede rupturing the membranes when flooding occurs at the commencement of labour at the full time.

259. *f. Hæmorrhage after the birth of the fœtus*, and before the expulsion of the placenta, is frequent and often sudden and profuse. In this case, strong pressure should be made over the hypogastrium in order to excite uterine action. A binder ought to be firmly applied over the abdomen, several folded napkins being placed under it, so that the fundus uteri be compressed. Dr. R. Lee advises the hand afterwards to be introduced to remove the placenta, but the removal of it should not be attempted until contraction of the uterus commences. After contraction, and the expulsion or withdrawal of the placenta, he directs a cloth wet with cold vinegar and water to be applied to the external parts, cold acidulated drinks to be given from time to time, and the patient to be preserved for two or three hours in a state of perfect repose. This plan will generally succeed when the hæmorrhage and retention of the placenta are caused by inactivity of the uterus. But when irregular action of the organ, or spasmodic contraction of the *os internum* or *externum uteri*, retains the placenta either altogether or partially, and thus causes *internal* hæmorrhage, additional means, especially the exhibition of opium by the mouth, are required. The passage of the hand, in order to remove the placenta, then demands caution and perseverance. If it cannot be accomplished, the turpentine enema, or embrocation, will generally aid in removing the difficulty. If the flooding arise from morbid adhesion of a portion of the placenta, the adhesion must be separated by the hand, in a manner that will readily suggest itself. Dr. T. Ramsbotham attributes these adhesions to partial separation of the placenta during pregnancy, from some accidental cause, followed by a slight discharge, the extravasated blood exciting inflammation of the separated surfaces with effusion of lymph, and consequent agglutination of them. This opinion is probably correct.

260. *g. Flooding after the expulsion of the placenta* requires a modified practice according as it arises. — 1st. From atony of the uterus; — 2d. From imperfect or remitting contractions; — 3d. From a portion of the placenta left in the uterus: — and, 4th. From inversion of the organ. As in hæmorrhage previously to the complete expulsion of the placenta, so in this the blood may be retained in the cavity of the viscus, by coagula, or by a portion of the secundines lodged in the os uteri or vagina. In every case, therefore, the state of the uterus and the integrity of the placenta should be ascertained. — Where simple atony of the uterus is the chief cause, constant and well directed pressure on the fundus uteri, especially by the hand, the sudden application of cold, or effusion of cold water; the turpentine enema, or draught; the ergot, &c.; are the most efficacious means. If the hæmorrhage be internal, from any of the causes just stated, the same measures will generally procure their removal, by contracting the uterus; but if these fail, they should be removed by the hand. The draining or recurring hæmorrhage, the expulsion of clots, the offensive nature of the discharge, and the constitutional effects consequent upon the presence of a portion of the placenta in the uterus, demand at first the same means as other states of the disease; but afterwards, and particularly when serious constitutional symptoms supervene, indicating a remarkable diminution, and marked vitiation, of the vital current, additional or other remedies should be employed. Weak solutions of the chloride of lime, or of soda, should then be injected *per vaginam*, or even into the uterus; and the decoction of cinchona with the chlorate of potash, or with muriatic acid; camphor in frequent doses; an occasional enema with spirits of turpentine, or draught with the same and castor oil; the sub-borate of soda, and other means calculated to support the vital energies, to increase the excreting functions, and to enable the uterus to contract and discharge the matters retained in it, should be prescribed.

261. The occurrence of hæmorrhage after delivery, whilst the uterus appears to be contracted, upon which Dr. Gooch has so unnecessarily insisted, is nothing more than its connection with an imperfect, remitting, or irregular contraction, in some cases, and with determination of blood in others; states previously known to the profession, and requiring, at most, but a modification only of the means insisted upon in the course of this article. In these, as well as in other cases, the application of pounded ice has been much praised; but the continued application of great cold is less beneficial than the shock produced by the affusion of moderately cold water, or by dashing a wet napkin upon the hypogastrium and external parts. Indeed the former may cause an imperfect or irregular contraction to pass into a state of relaxation, and thereby perpetuate the hæmorrhage. With respect to the hour-glass contraction of the uterus, insisted upon by Dr. Burns and others, in connection with flooding, the perspicacious remarks of Dr. Malins should be borne in mind. This acute physician observes that, as the contraction

of the uterus in the unimpregnated state, dividing it into two portions, disappears under gestation, the whole uterus then forming but one spheroidal cavity, so the removal of the distending causes allows the organ to recover, in a great degree, its original shape during contraction, and that thus two cavities again exist in some measure, divided by that contraction usually denominated the os internum uteri, perfectly natural indeed in character, but to which the name of hour-glass contraction as denoting a preternatural state, has been in error so constantly applied. The contraction of the circular fibres, which thus takes place, dividing the upper part of the genital canal into two chambers, when excessive, the other portions of the organs being relaxed, is not infrequently associated with hæmorrhage either whilst the placenta is still retained in the upper chamber, or after it has been thrown off, coagula filling the lower cavity, formed by the cervix uteri. The introduction of the hand into the uterus in order to excite it to action, or to press upon the part to which the placenta was attached as advised by Dr. Gooch and others, can seldom under judicious management, be necessary; and it is very doubtful if it will ever prove serviceable. Plugging the vagina, after delivery at the full time, requires the utmost caution and constant watching, even when the uterus is firmly contracting, as it may favour dangerous internal effusion.

262. *D. The management of a patient after dangerous uterine hæmorrhage* constitutes an important part of the treatment. Although the uterus is firmly contracted, and the patient seems comfortable, yet she ought not to be considered as altogether safe, as the uterus may again relax and the hæmorrhage return. This contingency ought to be guarded against by applying a proper binder, by perfect repose, and by a full dose of opium, if irritability or restlessness exist. Her position ought not to be changed for several hours, and the horizontal posture must not be departed from on any occasion. The room should be darkened and well ventilated, and nutrient but light fluids, in moderate quantity, should be given at stated intervals.

263. iv. THE PARTICULAR REMEDIAL MEASURES ADVISED BY AUTHORS FOR UTERINE HÆMORRHAGES require but little notice, after the full exposition of the treatment given above. — *a. Vascular depletions*, either general or local, are directed by several writers, and particularly by SCHENCK, LEFEVRE, and PELARGUS; but they are admissible only in the more active states, and as means of prevention, especially in these. When practised so as to derive from the seat of hæmorrhage, some advantage may accrue from *local depletions*, more especially from cupping over the sacrum or under the mammæ, as advised by HIPPOCRATES and ACTUARIUS. Several of the ancients resorted to cupping on the breasts; GALEN directed this operation to be performed over the hypochondria; and GONDRET prescribed *dry cupping* with large glasses, between the shoulders. *Emetics* have been prescribed in order to derive the circulation from the uterus, after bloodletting has been resorted to, by STOLL, GENDRON, REIDLIN, and KORTOM. CONRADI employed them to procure contraction of the uterus, and the expulsion of coagula in uterine hæmorrhage after delivery. They are certainly serviceable in some cases, but they require discrimination, and their effects ought to be carefully observed.

264. *b. Internal refrigerants*, particularly nitre and cold drinks, have been praised by several of the older writers. MM. MARTINET and DESLANDES have recently given the *nitrate of potash* in remarkably large doses — as much as six drachms in the twenty-four hours. It is not appropriate in cases of puerperal hæmorrhage, although it is sometimes of service in the active forms of the disease unconnected with pregnancy. I have given it in hæmorrhage after abortion, but with little or no benefit. The *muriate of ammonia* is more likely to be serviceable, especially in cases of debility, and when the discharge is draining or remittent. It may then be given with cinchona, or small doses of opium.

265. *c.* Of the application of *cold*, little further need be stated. It has been generally prescribed by writers from HIPPOCRATES to the present time. COLLOMB, DOEMLING, GAUTHIER, HIENSIUS, CHAUSSIER, and most modern authors, recommend it both internally and externally, in the forms of epithem and injection. RANOË, LOEFLER, JOSEPHI, D. D. DAVIS, and OLIVIER, direct cold drinks; whilst FIELIZ and THOMANN consider cold in any form inappropriate in uterine hæmorrhage after delivery, and in the passive states of the disease. There is much justice in this. The recourse to cold requires great discrimination; for, if too long applied, or if the cold be too great, much mischief may be produced by it. The sudden and temporary application of cold, so as to produce more or less shock to the frame, is certainly more beneficial, and more generally appropriate, than a prolonged recourse to it.

266. *d. Astringents* have been very generally administered both by the mouth, and *per vaginam*, in metro-hæmorrhagia. *Aluminated whey* has been prescribed by LENTIN, PASTA, MÜLLER, LINDT, STROEM, and HUFELAND. THILENIUS has directed it to be employed topically, by means of a sponge. WENDT and AASKOW have recommended the *sulphuric acid* with laudanum; GEBEL the tincture of *muriated iron*; and FOTHERGILL, CARRON, and WENDELSTATT, the preparations of *kino*, or of *catechu*. These medicines are even now in general use, but are most beneficial in the more passive states of the disease, unconnected with pregnancy or childbirth, and when the discharge is moderate and prolonged. Of the numerous astringents mentioned by writers, the *superacetate of lead*, in doses of two grains to six or seven, repeated according to the urgency of the case, has been most praised by modern authors, and especially by REYNOLDS, HEBERDEN, MITCHELL, YOUNG, WILLIAMSON, AMELUNG, THOMSON, &c. When the flooding is profuse, or occurs in connection with childbirth or abortion, only the most energetic astringents and the most rapid in their effects ought then to be given internally; and of these, the *spirits of turpentine*; the *ergot of rye* (SPAJRANI, CABINI, &c., in *Ann. Univers. di Med.*, 1830); and the *superacetate of lead*, in large doses, with opium in *acetic* or *pyroligneous acid*, are most deserving of notice.

267. *e.* The more *energetic tonics*, in large doses, have likewise been directed. They are appropriate in cases of debility, when the discharge is

prolonged without being excessive; and when it is unconnected with pregnancy or active determination to the uterus. In these circumstances, and when the disease is periodic, the preparations of *cinchona* have been prescribed by Stroëm, Starke, Duncan, Bang, Picque, &c.; the tincture of *cinnamon* by Plenck, Vogel, and Schneider; and the *sulphate of iron*, and other chalybeates, by Rath, Thilenius, and Doemling. The *sulphate of quinine* with sulphuric acid and tincture of cinnamon, or with sulphate of iron in the form of pill, will be given with advantage in many cases of this description.

268. *f. Ipecacuanha* in small doses has been much used by Paulisky, De Meza, Bruck, Holst, Loeffler, Stoll, Dalberg, Denman, and others; and small quantities of *tartar emetic* have been recommended by Chalmers. The former of these may be useful when the uterus contracts irregularly, and when the placenta is retained from this cause. But it is chiefly in combination with opium, or in frequently repeated doses, that any advantage can be expected from it. In hæmorrhage after delivery, but little benefit will be derived from *opium*, especially if given in large quantity, or depended upon chiefly. When thus exhibited it will rather impair than promote the contractions of the uterus. Yet circumstances will sometimes arise to justify the praises of opium expressed by Horstius, Heister, Young, Smellie, Ranoë, Chesneau, and Garthshore, especially in uterine hæmorrhage unconnected with pregnancy, or in that occurring in the earlier months of gestation. In these cases it may be given with dilute sulphuric acid (Aaskow); or in *clysters*, as directed by Mr. Copland. Harcke advised it to be used in injections thrown into the vagina — a method by no means to be advocated: and every practitioner of experience will be aware of the danger of administering opium, unless in very small quantity, in the form of enema.

269. *g.* In *passive metro-hæmorrhagia*, particularly when the powers of life are depressed or exhausted, *brandy* or other spirits have been resorted to by many practitioners, often in large quantity. Stimulants of this description are apt to give rise to a very serious affection of the head, and to protract convalescence. *Ammonia*, or *camphor* (Ettmüller), is less objectionable in such circumstances; and a judicious recourse to spirits of *turpentine*, as advised above, is much more efficacious, and less hazardous. — Of other internal medicines recommended by writers, no further notice than the simple enumeration of them need be taken. The *fungus militensis* has been mentioned by Linnæus; the *bursa pastoris*, by De Meza; the *geum urbanum*, by Stroëm; the decoction of the fruit of the *hippocastanus*, by Hufeland; *tannin*, by Cavalier; *savine*, by Rave, Fiest, and Wedekind; *purgatives*, by Lentin, Strack, and Conradi; and the *pimpinella*, by Riedlin. Whatever effects these may produce in the hæmorrhages occurring independently of pregnancy, but little benefit can be expected from them in those supervening during the puerperal states.

270. *h.* Various *external means* of arresting flooding after delivery have been adopted, and frequently with success. *Friction of the abdomen*, particularly when the uterus contracts either imperfectly or irregularly, and *compression* over the fundus of the organ by the hand, or by *compresses, bandages*, &c., have been very properly insisted upon by Levret, Tallony, Zeller, Vogel, Smellie, Osiander, Ingleby, Ramsbotham, R. Lee, and by most modern writers. Loefler directed that pressure should be made by means of a sand-bag. Dr. D. Davis and Dr. Beatty have recommended *bandages* constructed on purpose. Pressure on the descending aorta, through the abdominal parietes, has been favourably mentioned by Latour and Ingleby. Ploucquet advised the pressure to be made by the hand introduced into the relaxed uterus; and Eichelberger has adduced an instance of the success of this method. *Injections* of various kinds into the uterus have been employed. Prosper Alpinus, Thilenius, and Pasta prescribed the mineral acids much diluted; Galen, the juice of the plantago; Astruc, diluted vinegar; and Kok, astringent infusions, in this way. Fieliz directs the hand wet with vinegar; Wendelstatt, lint moistened with much-diluted sulphuric acid; and M. Gorat, a decorticated or divided lemon, to be passed into the uterus.

271. *i. Plugs* or *tampons*, moistened with various astringent fluids, have been very generally resorted to since the praises bestowed on them by A. Parey, Hoffmann, Leroux, Thilenius, Trioën, Held, Loeffler, Humberg, and Smellie. Some modern British authors have, however, supposed, that the addition of astringents is unnecessary, although they approve of the plug in nearly the same circumstances in which I have recommended it above (§ 253.), namely, when the os uteri is rigid. Soft lint or sponge may be used; but in such a manner as to fill completely the upper part of the vagina.

272. *k.* When all other means have failed — when the face is blanched; respiration is scarcely audible, or gasping or hurried; the pulse almost imperceptible or gone; the extremities cold or clammy; the power of deglutition lost — *transfusion* should be resorted to, although the chances of success from it are few. Dr. Hamilton has, however, seen recovery take place from this state by the ordinary means; but so fortunate an issue is rare. The question only is, whether the practitioner should still persist in the use of some of the more appropriate means, or have recourse to transfusion. The contingencies of resorting to it ought not to be kept out of view; for, if air pass into the vein, immediate death will follow. Phlebitis may even supervene although the operation has succeeded, and carry off the patient. The propriety and success of this measure have, however, been so far established by Dr. Blundell, Ingleby, and by some others, who have attempted it in circumstances of more doubtful propriety, as to justify the having recourse to it as an *ultimum sed anceps remedium*.

273. *l. The prevention of uterine hæmorrhage*, particularly in the puerperal states, is a subject of great importance. In the early months, the precautions recommended in the *article* on Abortion (§ 26. *et seq.*) should be adopted. In order to prevent hæmorrhage after delivery, Dr. Beatty and others advise an appropriate binder to be passed loosely round the abdomen, and drawn tight as circumstances may require. I am con-

vinced that a moderate degree of pressure on the parietes of the abdomen after delivery is of service in preventing not only uterine hæmorrhage, but also some other diseases, especially the different forms of puerperal fevers, &c.

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274. X. Of Hæmorrhage into serous or shut Cavities. — Owing to the organisation of serous membranes, hæmorrhage very seldom takes place from them; the vessels with which they are supplied rarely experiencing that degree of relaxation admitting of the exudation of blood, or even of a portion of its colouring particles. When blood is effused into cavities formed by serous membranes, it proceeds from one or other of the following sources: — 1st, From the rupture of an aneurism; — 2d, From the erosion, ulceration or rupture of an artery or vein; — 3d, From rupture or laceration of an organ or part; — 4th, From relaxation of the vital cohesion, with which the serous tissues and extreme vessels are endowed; — 5th, From deficient crasis, or other

changes in the blood; — and, 6th, From the co-existence of the last two conditions. Hæmorrhage may occur from the first, second, or third of these causes, without any manifest indisposition, or disorder sufficient to induce the patient to resort to medical advice; but it never appears as the consequence of the other pathological states, unless in the advanced stage of the most dangerous, depressing, or malignant maladies. When the hæmorrhage occurs from the former of these, it is often to a very great amount; but it very rarely is excessive when it proceeds from the latter states. In all, the existence of the extravasation is to be inferred from the presence of the *constitutional symptoms* (§ 25.) usually produced by profuse hæmorrhages. When the states of vital power and of the blood cause sanguineous exudation into the shut cavities, ecchymoses or petechiæ in other parts of the body, and hæmorrhage from mucous canals, are very generally also observed.

275. i. Hæmorrhage from the serous Membranes of the Brain or Spinal Chord very rarely occurs, unless as a consequence of concussions or injuries of the head or spine; or from violent exertion, particularly in warm weather, or under a hot sun. Sanguineous effusion between the membranes may, however, follow the rupture of small superficial aneurisms or varices, and the growth of malignant or other tumours, or the occurrence of ulceration, implicating the membranes. Hæmorrhage in these situations cause apoplexy and paraplegia, or other comatose and paralytic states. I have seen very slight effusion in the spinal canal in a case of tetanus; and Dr. Thomson observed it in a case of rabies. Bonet, Morgagni, and Ollivier, have seen effusion simultaneously between the membranes of the brain and spinal chord. (See arts. Apoplexy, Brain (§ 26.), Palsy, and Spinal Chord.)

276. ii. Hæmorrhage into the Pericardium may take place without rupture of the heart or large vessels within the pericardium, although more or less manifest rupture is the most frequent cause. — *Rupture* of the parietes of one or other of the cavities of the heart has been observed by Salzmann, Morgagni, Morand, Portal, Corvisart, Laennec, and several others enumerated in the subjoined references. In the larger proportion of these cases, the pre-existent lesions which occasionally give rise to rupture have existed. (See art. Heart.) But rupture of the coronary artery (Viridet), of the vena cava (Wright), or of one of the pulmonary veins, or of an aortal aneurism, or perforation of the aorta (Fiorati), within the pericardium, may be the source of hæmorrhage. Several instances of these are referred to below. Blood may also be effused, or rather exuded into the pericardium, in greater or less quantity, or mixed with more or less water, without laceration or rupture of any vessel. Cases of this kind have been observed by Vater, Baader, Sandifort, De Haen, Thomson, Hooper, myself, and others (see references); and occur chiefly in the advanced stages of adynamic, scorbutic, putro-adynamic, or malignant diseases. Sometimes the blood is poured out between the layers of the pericardium, forming sanguineous vesicles or ecchymoses. (Morgagni, De la Faye, Stoll.) When hæmorrhage into the pericardium arises from any of the kinds of rupture just enumerated, death generally takes place suddenly; but when it is exuded, as just stated, the already depressed vital power is increased, and the oppressed action of the heart is more slowly abolished by the effusion.

277. iii. Hæmorrhage into the Pleural Cavities has been observed by Morgagni, Plenciz, Caldani, Stoll, Frank, Johnson, myself, and others. It most frequently arises from rupture of an aortal aneurism within the thorax. In this case, the blood is effused, in the first instance, into the posterior mediastinum, death seldom occurring until the accumulated blood lacerates this part, and opens the way to suddenly fatal effusion into one of the pleural cavities. The aneurism may be so large as to occasion symptoms which will lead to its recognition; or it may be so small, and attended by so little disorder, as to escape detection, as in the case of Sir David Barry, an eminent member of the profession. In him, the symptoms before, and the appearances after, death illustrated this procession of the morbid phenomena. Hæmorrhage into the pleural sac may proceed, also, from erosion or ulceration of the aorta (Morgagni, Portal); from rupture of the pulmonary vein (Eicken); from rupture of the vena cava (Portal); or from rupture, or a varicose state, of some of the veins near the pleural surface (Caldani, Portal, &c.). Hæmorrhage into the thorax is frequently consequent upon fractures of the ribs and wounds; and many of the instances, where it seems to have arisen spontaneously, have been induced or hastened by external injury or muscular exertion. — More or less blood may be *exuded* from the surface of the pleura, in states of very intense inflammation attended by diminished vital resistance, or during the advanced stages of putro-adynamic fevers and of other malignant diseases. But these are comparatively rare occurrences; and the blood effused is seldom pure, but mixed with much serum or watery exhalation; or, rather, the effused serum is more or less deeply coloured by an admixture of red particles.

278. iv. Hæmorrhage into the Peritoneal Cavity, like hæmorrhages into other serous cavities, seldom occurs, unless as a consequence of external injuries or wounds. It sometimes depends upon rupture of a large vessel, or the laceration of some viscus, especially the spleen, liver, or stomach; but it may proceed from other lesions. Ballonius, Portal, Daniel, and others, have recorded instances of its occurrence from rupture of the spleen; a case of which has come under my own observation. Ayrault mentions an instance in which it arose from ulceration of some of the vessels of this viscus. Blane found it to proceed from the surface of the liver. When the spleen or liver is engorged or enlarged, after repeated attacks of ague, particularly in warm or miasmatous countries, a comparatively slight external injury, or a concussion of the trunk, may occasion laceration or rupture of either, with extravasation of blood in the abdomen. Hæmorrhage in this situation may arise, also, from operations for strangulated hernia, especially when a portion of omentum has been removed; or from paracentesis in cases of ascites (Bellocq), or of encysted dropsy. Rupture of an aortal aneurism, or

of the aorta without any pre-existent aneurism (Ferro, J. P. Frank, James, Arnott, Rose, Hume, &c.), of the vena cava (Bonet, Lancisi), of the vasa brevia (Sandifort), of the mesenteric artery (Ferro), and of the splenic artery (Nenei), with hæmorrhage into this cavity, have been severally noticed. Jenty mentions a case in which rupture of the vena cava seemed to have been favoured by curvature of the spine. Heim traced the hæmorrhage to the ovarian vessels; Palfyn, to the vessels of the omentum; Godelle, to rupture of a Fallopian tube; and Portal, to the mesenteric vessels, in a female who had experienced sudden suppression of the catamenia in one instance, and to the ovarian vessels in another. In cases of tubal or ovarian fœtation, extravasation of blood into the abdominal cavity is a necessary consequence of the growth of the ovum; and it has been observed in such circumstances by Büttner, Heim, Clarke, Painter, myself, and many others. — Osiander met with hæmorrhage into the peritoneal cavity after delivery, that had arisen, in his opinion, from dilatation of the Fallopian tubes. The exudation of blood, or of a bloody serum, from the peritoneal surface occurs only during those morbid states, in which it has been observed to take place into the pericardium or pleura. (See art. Peritoneum.)

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279. XI. Hæmorrhage into the Areolar Tissue, or into the Substance of an Organ, occurs in two forms: — 1st, Confined to a single part or organ; — 2d, Extended to several organs, and more or less diffused. The *pathological states* of which either of these forms may be the result are chiefly the following: — *a.* Increased determination of blood or vascular action; — *b.* Active congestion, or engorgement from increased flow of blood to the part; — *c.* Passive congestion from interruption to the return of blood from the seat of hæmorrhage; — *d.* Softening, or diminished vital cohesion, of the organ in which extravasation takes place; — *e.* Disease of the vessels of the part favouring rupture, &c.; — *f.* Laceration or rupture of an organ from concussions or external injuries; — *g.* Loss of vital tone, expressed chiefly in the extreme capillaries; — *h.* A morbid state of blood; — and, *i.* These last two conditions conjoined. The more limited forms of hæmorrhage into cellular or parenchymatous parts may arise from either, or from more than one, of these pathological states; but the more diffused or extended depends chiefly upon the last three of them. The former may occur primarily, or without any very manifest sign of pre-existent disorder, although such disorder actually exists; the latter is generally the result of very serious and evident disease, especially of scurvy, purpura, putro-adynamic or malignant fevers, &c. — The organs, in the structure of which hæmorrhage most frequently occurs, are the brain and cerebellum, the spinal chord, and the lungs; and those in which it is more rarely observed are the spleen, liver, pancreas, and kidneys. It still more rarely takes place in two or more of these parts at once, unless in the

course of the dangerous constitutional maladies just mentioned. M. ROBERT (*Nouv. Biblioth. Méd.* t. ii. p. 74. 1826) records a case in which he found blood effused in the substance of the brain, lungs, liver, pancreas, and kidneys; but the pre-existent constitutional disorder was characterised by extreme adynamia, manifested especially in the vascular system and circulating fluids.

280. Hæmorrhage into the *areolar tissue*, particularly in those parts of it that possess the membranous form, giving rise to ecchymoses, petechiæ, &c., occur chiefly in *purpura, scurvy*, and the last stages of malignant exanthematous and other fevers; and in these diseases hæmorrhage generally takes place, also, from mucous surfaces, and sometimes, likewise, into the substance of one or more organs. In these cases, the blood is dark, dissolved, or deficient in crasis, and incapable of coagulating. The instances of "*Universal Hæmorrhage*" (*Hæm. Universalis*) recorded by several writers of the sixteenth and seventeenth centuries are entirely to be referred to the above maladies, or to a scorbutic, conjoined with a hæmorrhagic, diathesis, generated most probably by the nature of the food and modes of living, and to the putro-adynamic state which exanthematous and typhoid fevers then frequently assumed. (See arts. APOPLEXY, BRAIN, LUNGS, PALSY, PURPURA, SCURVY, &c.)

HÆMORRHOIDS.—SYN. Αἱμοῤῥοις (from *αἱμα*, blood, and *ῥοος*, a flux), Hippocrates, Galen, Celsus. *Hæmorrhois*, Pliny, Linneus, Sagar, Sauvages, Cullen. *Hæmorrhoides*, Juncker. *Fluxus Hæmorrhoidalis*, Hoffmann. *Proctorrhæa*, Auct. var. *Proctalgia Hæmorrhoidalis*, Macbride. *Marisca*, Good. *Hæmorrhischesis*, Ploucquet. *Hæmorrhœa Vasorum Hæmorrhoidalium*, Swediaur. *Hémorrhoïdes, Flux Hémorrhoïdal*, Fr. *Goldaderfluss, Hämorrhoiden*, Germ. *Morice*, Ital. *Piles.*

CLASSIF. — 1. *Class*, Febrile Diseases; 4. *Order*, Hæmorrhages (*Cullen*). 1. *Class*, Diseases of Digestive Organs; 1. *Order*, Affecting the Alimentary Canal (*Good*). II. CLASS, II. ORDER (*Author*).

1. DEFIN. — *Pain, tension, weight, heat, or other uneasy sensation, referred to the rectum and anus, accompanied or followed by tumours in these parts, or by a flow of blood from them when the patient is at stool; recurring after intervals, and sometimes periodically.*

2. *Preliminary Remarks.* — There are few diseases upon which so much has been written — ignorantly and dogmatically written — as upon hæmorrhoids. In modern times, the pathology and treatment of this disease have been too generally viewed in a limited point of view, and usurped by persons who have endeavoured to convince the public that they have made it the subject of especial investigation, or even of exclusive study. — Judging, however, from their writings, more mischief than benefit has thus arisen from the mechanical division of labour they have adopted; and not only have they failed in advancing our knowledge as to the nature and treatment of the malady, with which they profess so intimate an acquaintance, but they have actually overlooked, or been ignorant of, the part it occupies in the circle of morbid action, and they have frequently, even when affording temporary benefit by empirical means, or by local or surgical aid, caused most serious consequent mischief. Those affected by this complaint are unable to foresee the consequences that may result from injudicious interference, especially if appropriate medical treatment be not afterwards pursued; and, whilst immediate relief, when procured, is made a matter of high commendation, both by those who receive, and by those who administer it, the remote or contingent bad effects are rarely traced by them to their origin, and are often of such a nature as to terminate all inquiry.

3. Of those who have professed an infallible cure for hæmorrhoids, there have been few who appear, from their writings, to have been acquainted with the nature of the complaint; with the relation in which it often stands to other morbid conditions; with its frequent existence as the more manifest part of a more important and concealed state of disease, and with the most safe and appropriate means of removing it. They have viewed it as a local disorder which is to be cured by local or surgical treatment, and not as a visceral disease often depending upon latent or extensive morbid conditions, to which surgical measures may prove injurious; and for which such measures are at most only occasionally required, and then as adjuvants merely of a strictly medical, and often constitutional, treatment. Owing to an imperfect knowledge of the varieties of hæmorrhoidal tumours, and of their pathological relations — *a*. Fatal hæmorrhage has not infrequently resulted from excising or puncturing them; — *b*. Enteritis, peritonitis, and even internal phlebitis have followed the extirpation of them by ligature; — and, *c*. Fatal diseases of the brain, or of the lungs, or even of the liver, have arisen from the permanent stoppage of a discharge by these means, to which the system had become habituated, and which had warded off these and other serious maladies. This evacuation being arrested by these or other local measures, the safety valve to an overloaded state of the vascular system is permanently closed; and a source of local derivation and of discharge, that had preserved a vital organ from impending disorganisation, is cut off, without either preparing the system for the changes thereby produced, or substituting some other evacuation in its place. Persons who thus extend the division of labour principle to a science which admits not of it with advantage either to the branch which is thus attempted to be cultivated, or to those upon whom it is practised, may reply, that *they* have seen no mischief result from the means they employ; but the mischief in such cases is strictly of a medical nature, is often remote, and falls not within the sphere of those who thus unscientifically and empirically limit the practice of their profession. Division of labour may improve manual dexterity, or may extend mechanical contrivance; but it cannot improve pathological knowledge, nor illustrate the relations or associations of morbid actions, nor lead to truly scientific, and safe, and appropriate, and permanently beneficial, modes of cure.

4. I. PATHOLOGICAL HISTORY OF THE DISEASE. — The term *hæmorrhoids*, signifying, literally, a flow of blood, was made use of by HIPPOCRATES; and, down even to the present time, has been applied to a dilatation of the veins at

the extremity of the rectum, accompanied with a flow of blood; and the vessels of this part have been consequently called the hæmorrhoidal vessels. Many of the ancient and of the older writers have extended the term, not only to every complication of this complaint, but also to hæmorrhages from natural outlets; and thus hæmorrhoids of the uterus, of the bladder, and of the mouth, have been frequently used to denote hæmorrhage from these parts. Since the time of MORGAGNI the term has been applied indifferently to that morbid condition which was generally attributed to dilatation of the hæmorrhoidal veins, and to hæmorrhage from the rectum, although some authors have endeavoured to restrict it to one or other of them. But as the tumours and the flow of blood, whether appearing separately or in conjunction, arise from the same source; I shall consider them as varieties of the same disease. It will, however, be shown that the hæmorrhoidal tumours consist of different kinds or modifications of structural lesion, and that either of them may take place independently of, as well as in connection with, a discharge of blood from the anus.

5. i. *General Character and Symptoms of Hæmorrhoids.*—The first attack is usually slight, and often attended by little constitutional disorder. Slight pain, heat, weight or fulness, are felt at the extremity of the rectum, or about the sacrum, sometimes extending to the perineum, with obscure tenesmus or pain at stool, often with costiveness, and occasionally with an irregular or irritated state of bowels. The sensibility of the bladder or urethra is frequently also increased. After a short time, or in two or three days, at most, a slight flow of blood, generally of a bright colour is observed with the fæces, or smearing their surface. In some persons this flow does not take place, particularly in early attacks; but when it does, it is usually critical, and all the symptoms subside. When this discharge does not occur, as well as very frequently when it does, one or more tumours, of varied size, begin to appear within or at the verge of the anus. These tumours are preceded by a stinging or pricking pain, which increases as they enlarge; or are compressed by the sphincter ani. Sometimes blood oozes from their surface, or is squirted out through small apertures when at stool. Occasionally they remain dry, or are moistened by a colourless serum; but, in either case they collapse, after a short time, and entirely or partially disappear.

6. After a longer or shorter interval the same train of symptoms returns, generally in a greater degree, and acquires increased severity by the repetition. The pains are more acute, especially when sitting, standing, or walking; and often extend down the insides of the hips and thighs; the blood is discharged in greater quantity; and the tumours, if they have previously been developed, become larger or more numerous. Subsequently, when they collapse, and particularly when they have been often distended, they present so many flaps of skin, and when external form a serrated margin to the anus.

7. In irritable or weak persons, especially when the complaint is simple or primary, is severe, or returns often, the local alteration affects more or less the general health. Frequent chills, or coldness, alternating with flushes, dryness of the mouth, hardness or frequency of pulse, costiveness, pallor of the countenance, and other febrile symptoms, are complained of. The functions of digestion are also more or less deranged, and the bowels are either costive, or irregular, especially when the complaint is dependent upon disorder of the hepatic organs. When it is associated with disease of the lungs, the symptoms referrible to the chest are generally materially alleviated by it, especially if it be attended by sanguineous discharge; and a similar result follows its occurrence in plethoric persons liable to headachs, or to congestion of the brain or liver. In all cases, however, care should be taken not to mistake the constitutional disorder, or the affection of remote organs, often occasioning the disease, for sympathetic disturbance preceding the hæmorrhoidal attack. A minute examination of the relation of the complaint with other ailments should always be instituted, before the indications of cure are determined upon.

8. Such is the usual course of hæmorrhoidal attacks; but the sense of weight, heat, fulness, or constriction, with more or less pain about the anus, and slight constitutional disturbance occasionally occur without either effusion of blood or the formation of tumours, even in old cases; and the hæmorrhage sometimes takes place without the tumours, but seldom without being ushered in by the other symptoms. Indeed, in all cases, indications of congestion, or of increased action of the vessels of the part are present in some degree, these states of the vessels constituting a principal feature of the complaint. Both the local and constitutional symptoms, and the structural lesions, show, that increased determination of blood to the extreme vessels of the part, in most cases, and impeded return of it from them, in others, are the chief pathological conditions of the disease.

9. ii. *Of the Hæmorrhoidal Tumours.*— The nature of these tumours was not understood until lately. They were usually distinguished into *internal*, and *external*, and into *bleeding*, and *blind*, piles, according to their situation in respect of the verge of the anus, and to their connection with a sanguineous discharge. But most of the older writers and many of the moderns, and amongst the latter the BELLS, HOME, BAILLIE, COOPER, &c., imputed them to dilatation of the veins. More correct views as to their structure were entertained first by LE DRAN and RICHTER, perhaps also by CULLEN and ABERNETHY; and more certainly by CHAUSSIER, DE LARROQUE, DE MONTÈGRE, CALVERT, and COLLES. From my own observations, as well as from the researches of these and other pathologists, hereafter referred to, there are *three kinds* of hæmorrhoidal tumours, differing essentially both in their structure and appearance. — *a.* The *first*, or most common kind is first seen in the form of fleshy tubercles, of a brownish or pale red colour, situate within the anus, or descending from the rectum. They have a somewhat solid or spongy feel; and, when divided, they present a compact or porous, and bloody surface. As the blood oozes from the cut surfaces, they become pale and flaccid. When the tumours are *external*, they are paler and more elastic; are infiltrated by serum; and are sooner produced, and disappear more readily, than when they are *internal*.— In

either case, they often contain a central cavity filled with fluid or coagulated blood, of a dark colour. This cavity is either smooth or granulated, and minute vessels may be traced into it; Mr. CALVERT states that it has no direct connection with any larger vessels. It is usually small; generally about the size of a pea, but sometimes that of a bean, or walnut, or even larger. More frequently, however, there is no regular cavity or cyst; the substance of the tumour being as if infiltrated with blood, which becomes coagulated and dark: but this appearance is not owing to extravasation, but rather to dilatation of a number of small vessels which traverse the tissue in the direction of the axis of the rectum, as, upon dividing the part longitudinally, numerous dark streaks are seen in its substance, whilst a section made transversely shows only small roundish specks.

10. The patient is usually made sensible of the development of these tumours, by a peculiar pricking or stinging sensation, within or at the margin of the anus; and one or more are found slightly elevated, or pressed downwards by the sphincter. The increase of these tumours takes place more by elongation than by expansion, and they assume a conical form, and are larger than their necks. Sometimes blood is exhaled from their surface; in other cases, or on other occasions, a serous fluid is exuded; and occasionally they are entirely dry, especially when they are external. In either case they generally disappear in two, three, or four days; but return again at an uncertain or at a regular period, and increase in size, becoming firmer in texture. After some blood is evacuated from them, or after the determination of blood to the parts has ceased, they collapse, leaving small pendulous flaps of skin, which ultimately disappear if the tumours have been small; but if they have been large, these flaps continue conspicuous, and give a projecting and irregular margin to the anus. Having been strangulated by the sphincter, or repeatedly engorged with blood or lymph, or chronically inflamed, these tumours become more solid and almost permanent, are a source of constant discomfort, and give rise to several of the consequences and complications about to be noticed (§ 20.).

11. The permanent state of the tumours is owing partly to the development of capillary vessels, and partly to the effused blood and lymph becoming organised; this latter circumstance especially giving rise to the excrescences, or irregular mass of tumours found around the anus in those subject to hæmorrhoids. — Occasionally the tumours acquire a very great size, arising from the effusion of much blood in the central cavity, and of blood and lymph in the cuticular envelopes. Instances of the enormous size of these tumours have been recorded by SCHMUCKER, CALVERT, and other writers about to be referred to.

12. *b.* Hæmorrhoidal tumours *formed by a varicose state of the veins* of the rectum are not so common as those just described. They seldom attract attention until they have made some progress, for the distension takes place very gradually, without causing much sympathetic disturbance, or materially increasing previous disorder. They are not so disposed to enlarge at particular periods, and are more permanent and less painful than the form already noticed. They are commonly of a dark or bluish colour, and soft and elastic to the touch. When compressed by the finger they become sensibly less, but return to their former state when the pressure is removed. They are round and broad at the base, and often distributed in irregular or ill-defined clusters. They evince little disposition to bleed, unless when ruptured or injured. They appear crowded together, extend up the rectum, are more or less internal, or become external chiefly during costiveness, or when the patient is straining at stool, or after a fæcal evacuation; whilst the former kind is limited, and generally external, or within the reach of the finger. VALSALVA, LUDWIG, PETIT, RICHERAND, BEGIN, CALVERT, and others, have seen hæmorrhoidal varices extend upwards along the rectum to the colon, especially in persons who had experienced obstruction of the portal circulation. M. BEGIN observes that, in most cases, the dilated superficial, submucous, or subcutaneous veins are only the smaller part of those surrounding the rectum. Sometimes the lower part of this intestine appears as if plunged in the middle of a network of dilated and engorged veins, forming a thick vascular ring, the incision or puncture of which may give rise to dangerous hæmorrhages. M. RICHERAND found, upon dissection, those varicose tumours filled with clotted blood, and their interiors continuous with those portions of the veins which retained their usual size. These dilated vessels presented alternately a state of distension and their natural calibre; and were continued in every direction, forming a plexus around the outlet of the bowel, the dilated portions being covered only by the thinned mucous membrane.

13. As the varicose tumours arise from many of the causes that produce the preceding form (§ 9.), and as both varieties occupy nearly the same situation, it may be reasonably inferred that they may exist together, or that the latter may often give rise to the former in connection with it. Now this is sometimes the case; inflammatory irritation, supervening in the course of the varicose form of the disease, superinducing the *mariscæ*, or the first variety of tumour, and thereby obscuring the varicose character of the former. Or a different procedure, as Mr. CALVERT supposes, may take place; the veins becoming dilated in consequence of the previous formation of the cellular tumours. These complications of the tumours can be ascertained only by a careful examination, and by attention to the history, progress, and symptomatic relations of the case.

14. *c.* A *third form* of hæmorrhoidal tumours, of an *erectile* character, was first noticed by Sir JAMES EARLE, and more particularly described by Mr. COLLES. These tumours are of different sizes; are soft and spongy to the touch, of a purplish colour, with a number of minute, but distinct, vessels on the surface of each. One, two, or more of these tumours protrude through the anus when the patient is at stool. Early in the disease the protruded parts retire spontaneously; but, in advanced stages, they require to be replaced by the hand. Alvine evacuation is followed by pain, which, especially when the disease is prolonged, does not cease for two or three hours; and is attended by losses of blood,

which sometimes occasion exsanguine exhaustion; the *sphincter ani* becoming wide and relaxed, and the tumours protruding. Dr. COLLES states that, on examination after death, he found bloodvessels as large as crow-quills, running for some way down the intestine, and then dividing into a number of branches; each of these vessels ramifying profusely, and each forming, by the interlacing of its numerous branches, one of these erectile or vascular tumours. The trunks and branches of these vessels were covered only by the lining membrane of the intestine.

15. iii. *Of the Hæmorrhoidal Discharges.*— *A.* The ancients believed the blood to be discharged from the tumid extremities of the hæmorrhoidal veins. MORGAGNI found these veins more or less dilated in several cases, and it was very generally considered that the blood oozed through, or proceeded from rupture of, these vessels. The investigations of modern pathologists have satisfactorily shown that the hæmorrhage may arise from various sources: — 1st, From congestion of the vessels of the part followed by exhalation or exudation from the internal surface of the rectum; — 2d, From irritation of this bowel, followed by vascular determination and sanguineous exhalation;—3d, From the surface of the hæmorrhoidal tumours, especially those belonging to the first and third varieties;—and, 4th, From the rupture of varicose or enlarged vessels. When the blood proceeds from the *first* or *second* of these sources, it may be seen to exude from the surface of the protruded portion of bowel; and the discharge generally removes all the symptoms characteristic of the complaint. It is also frequently preceded, and followed, by an exhalation of a serous nature, from the same source. Hæmorrhage, in connection with the common form of tumour, may arise from exhalation from its surface; or from the contraction of the sphincter forcing blood, in a fine stream, from one or more points of it; or from exhalation from the adjoining mucous surface, in consequence of congestion of, or of sanguineous determination to, the affected bowel. Where the vascular or *erectile* tumours exist, blood is always discharged, and uniformly from their surface. The *varicose form* of tumour is less frequently attended by hæmorrhage than any of the others. When the blood proceeds from the rupture of enlarged or varicose vessels, it generally flows in a stream whilst the patient is straining at stool, the flow increasing or returning when this effort is repeated. The passage, also, of hardened fæces over the congested or inflamed mucous surface of the rectum, or over the tumours developed beneath this surface, or over the enlarged or distended vessels, may lacerate or injure them in such a manner as to be followed by hæmorrhage, but in such cases the discharge is usually slight.

16. In many cases, the blood flows for a short time only, and is not again seen until the next attack. But in others, it is observed repeatedly when the bowels are acted upon, or the discharge is renewed when the fæces are expelled, for several days. It is generally of a red colour, and either covers, or follows, the fæcal evacuation; but when it is consequent upon venous congestion or dilatation, it is of a dark hue, and follows, or is partially mixed with, the fæces.

17. *B.* The *returns and amount of the hæmorrhoidal discharge* are extremely various; but in many instances a periodical return is observed in both males and females. In females, the hæmorrhoidal, not infrequently takes the place of the catamenial discharge, especially at the age when the latter usually ceases, and assumes a periodic form. In some instances, these evacuations alternate. When the morbid action has once commenced in this part of the body, it being favoured by peculiarity of structure and by several pathological relations (§ 30.), there is always a predisposition thereby formed to the recurrence of it; and the same causes still operating, it at length becomes habitual, and even necessary to the prevention of more serious maladies. It has been satisfactorily shown by observation that, as long as the causes of hæmorrhoids continue, the evacuation attending them is a wholesome occurrence, inasmuch, as an overloaded state of the vascular system, that would otherwise induce dangerous visceral disease, is thereby removed. In all cases, therefore, when hæmorrhoidal affections depend upon constitutional causes, or are connected with any indications of visceral disease, or have existed for a considerable time, their return should not be prevented, unless other sources of discharge, or other sanguineous evacuations are substituted for them: but, when they proceed from causes which are chiefly or entirely local, neither the vascular system nor constitution, nor any important internal organ manifesting disorder, a more active interference may be attempted; although even then with caution, especially if there be any tendency to vascular plethora, and if the principal causes of the disease are still in operation.

18. The *quantity* of blood lost in each attack may be very trifling — may not exceed a drachm or two; or it may amount, at one time, to several pounds. Instances are adduced by RHODIUS, FERNELIUS, LANZONI, HARRIS, SPINDLER, MOEHRING, HOFFMANN, EARLE, CALVERT, and others, in which the quantity discharged seemed enormous. Mr. CALVERT supposes that the vessels in such cases are in a state of extreme excitement: but this is by no means a correct inference; as, in most cases of excessive discharge, the hæmorrhage is passive or venous, or is consequent upon congestion, or upon interrupted circulation through the hæmorrhoidal vessels. The evacuation more commonly is excessive from its frequent return, than from its quantity at any one time; and it not infrequently induces a state of exsanguine exhaustion, requiring the most decided interference.

19. *C. A colourless Hæmorrhoidal Discharge — Mucous or serous Hæmorrhoids* (*H. mucosæ vel serosæ*) of Authors; *Hémorrhoïdes blanches*, BEGIN; *Medorrhœa Ani*, J. P. Frank — sometimes takes place, and either follows the discharge of blood, or attends the hæmorrhoidal tumours, especially those belonging to the first variety. It varies much as to quantity and appearence. It is either watery or mucous; or resembles a weak solution of gum; or it is albuminous and like the white of egg. When watery, serous, or mucous, it usually exudes slightly from the anus; when more abundant or albuminous, it is commonly passed at stool. In cases attended by much heat and irritation about the anus, a colourless exudation, consisting chiefly of an increased secretion from the follicular

glands of the part takes place. These varieties of colourless discharge are most frequent when there is little or no hæmorrhage, and when the disease is associated with *ascarides*, or with *leucorrhœa*, or with *pregnancy*.

20. iv. *Of the Consequences and Complications of Hæmorrhoids, local and constitutional.* — *A. Inflammation* is one of the most frequent morbid associations of hæmorrhoids. It is attended by more or less swelling and redness of the lower part of the rectum and anus; by throbbing and by increased sensibility and heat, aggravated by the passage of fæces. The sanguineous discharge is slight or absent; but if it become abundant, the symptoms subside. A mucous discharge is, however, not uncommon. Sometimes the inflammation is severe, and implicates not merely the mucous membrane and subjacent cellular tissue, but also in a slighter degree the prostate gland and neck of the bladder, occasioning much pain in the perineum, sacrum, &c., with dysuria, or even strangury. The irritation may even extend to the womb in females. The tumified state of the lower part of the intestine in these cases, together with the inflamed tumours, and the spasmodic constriction of the sphincter, produces obstinate constipation and straining or tenesmus. Not infrequently the protrusion of the tumours, when internal, with a portion of the mucous membrane, follows the action of the bowels, and the inflamed tumours, being strangulated by the sphincter, become remarkably painful, or even ultimately slough. With the severity of the local symptoms, the constitution generally sympathises; and febrile symptoms are developed, particularly in irritable or nervous temperaments.

21. *B. Fissures or rhagades of the anus* are not uncommon in cases of hæmorrhoidal tumours. They may commence in small longitudinal ulcerations; but they more frequently seem to take place as follows:—When the tumours are large and numerous, hardened fæcal matters, in passing forcibly between them, crack or slightly tear them at their bases, the chronic inflammation in this situation hardening and rendering the tissues less yielding to any distending power. These fissures are most apt to occur when the tumours are situated upon the sphincter. They are usually slight at first, but they enlarge, owing to the frequent operation of the causes that produced them and to the lodgment of fæcal matters, and occasion great pain, which continues for some hours after each stool, and spasmodic constriction of the sphincter. Herpetic or other chronic eruptions sometimes also appear about the anus, and favour the supervention of these fissures, by rendering the surface harder and less capable of distension, or by diminishing its vital cohesion. Fissures of the anus mostly occur as a consequence of the first and third variety of hæmorrhoidal tumour.

22. *C. Ulceration or abscess, frequently passing into fistula,* often follows hæmorrhoids, particularly when inflammation occurs. When the inflammation is superficial, affecting chiefly the mucous membrane, it gives rise to ulceration in one or more points, especially in the situation of the tumours; and it may penetrate deeply, or be followed by small abscesses, either in these tumours or in their vicinity. When the inflammation is more deeply seated, implicating the cellular and adipose tissues, an abscess then forms very readily and often rapidly. Pain, tension, and heat about the anus are then severe, and with the throbbings, extend up the pelvis. When the abscess is anterior to the anus, and presses upon the urethra, and parts adjoining the neck of the bladder, the suffering is very great, and sometimes is attended by strangury or total retention of urine. The abscess, in the female occasionally extends to one of the labia, or even breaks into the vagina, or passes into fistula in that, or in an adjoining situation. Of this I have seen several instances. — (See art. RECTUM.)

23. *D. Hæmorrhoidal tenesmus, or spasmodic constriction of the sphincter, frequently with protrusion of the mucous coat of the rectum,* is a common complication of hæmorrhoidal affections, particularly when the tumours are inflamed, or when there are fissures between them (§ 21.). If the tumours are seated within, or above the sphincter, or if the mucous or submucous tissues are much tumified or infiltrated by inflammatory determination, the actions of the parts of the bowel above this, or the efforts at expelling fæcal matters, are attended by much tenesmus and often cause a protrusion of the tumours and tumified parts, sometimes to the extent of partial invagination of the rectum. When the sphincter is spasmodically constricted, in consequence either of the irritation of the internal surface of the intestine, or of fissures in the anus, the veins are grasped so firmly by it as to give rise to a congested or varicose state of those external to, or below, the constriction, and the disease is thereby aggravated and prolonged. This irritable or spasmodic state of the sphincter may exist in nervous persons, without fissure or inflammation, and be attended by great pain, as shown by M. DUPUYTREN; but it most commonly is associated with one or both of these morbid states, as well as with a bloody or colourless discharge, and with hæmorrhoidal tumours, or with either of them only.

24. *E. The pain of hæmorrhoids* varies in character in different cases. In some it is constant; aggravated upon passing a motion, and is attended by heat and throbbing: it is then owing chiefly to inflammation. In others it is intermittent, extremely severe at times; comes on and ceases suddenly; is eased by pressure; and is of a nervous character. This kind of pain is often connected with spasmodic constriction of the sphincter, and was denominated *proctalgia* by SAUVAGES. The pain is often also connected with fissure, as shown by BOYER, MERAT, MONTÈGRE, and others; and is then pungent, lancinating, cutting, lacerating or peculiar, and greatly aggravated by the action of the bowels. In many cases, the pain extends to the insides of the hips and the back of the thighs, or to the urinary organs and urethra; and occasionally up the pelvis into the abdomen. Indeed *colicky pains*, often of a severe kind, usher in an hæmorrhoidal attack, as well as supervene in its course, or upon certain modes of curing it, as upon the application of ligatures on the tumours.

25. *F. Irritation or inflammation of the neck of the bladder and prostate*; painful affections of these parts of the urethra, and of the vesiculæ seminales; difficult or painful micturition; retention of urine; and prolapse of a portion of the rectum; are not infrequent complications of

hæmorrhoids. *As more remote consequences* of the disease, may be mentioned, fistula in ano, recto-vaginal fistula, induration and thickening of the surrounding cellular tissue, permanent stricture of the rectum, and chronic or constant prolapsus ani. These, and some other organic lesions conconsequent upon hæmorrhoidal attacks, are fully described in the article RECTUM.*

26. II. DIAGNOSIS. — *a.* Hæmorrhoids may be confounded with *Intestinal* HÆMORRHAGE (§ 185.); but in that disease the local symptoms and lesions characteristic of hæmorrhoids are not present in a prominent or primary manner; nor can a varicose state of the vessels, nor any other form of tumour, be detected upon examining the rectum with the finger. Besides, intestinal hæmorrhage is more generally a symptom of an acute or dangerous visceral disease, and more frequently appears in the advanced stages of adynamic or other fevers, or as a symptom of non-febrile cachexia, than the hæmorrhoidal discharge, whilst this latter is more commonly the principal and most manifest, if not the primary, affection. It may, however, sometimes happen that a patient subject to hæmorrhoidal affections is seized with low fever; or with remittent or simple fever, complicated with congestion or obstruction of the liver, with or without jaundice; and hæmorrhage from the bowels supervenes. The question is, whether, in either of these cases, the blood is discharged from the testinal mucous surface (see arts. FEVERS (§ 474.), and HÆMORRHAGE (§ 185. 196.)), or from the hæmorrhoidal vessels or tumours (§ 15.). These are not uncommon cases: I have seen several. A fatal instance of this kind occurred in my practice whilst writing this article. The diagnosis is of importance, as the prognosis and treatment are both affected by it. If pain, tumours, or other symptoms referrible to the rectum or anus, are present; if they be increased by the action of the bowels, and the blood discharged at that time appear fluid and recently extravasated; and if an examination of these parts, as far as it can be accomplished, show the presence or increase of hæmorrhoidal disease; then the hæmorrhage proceeds from it: but if the blood be clotted, very dark, mixed with the secretions or fæces, or consist of small coagula, the calls to stool not being attended by any distress, the source of the discharge is above that which is the seat of hæmorrhoids, and the examination post mortem will show the accuracy of the inference.

27. *b.* Hæmorrhoidal *tumours* may be confounded with *fungous* or *polypous* tumours or excrescences of the rectum or anus; but these latter enlarge progressively; their surfaces are indolent; and they rarely give rise to hæmorrhage, or to paroxysmal attacks resembling hæmorrhoids, or to inflammation of the adjoining parts. *Venereal excrescences* about the anus may be ascertained by the history of the case, by their development exteriorly to the rectum only, and by the morbid appearance of their surface. The slightest observation, and the least experience, are sufficient for the diagnosis in these cases.

28. III. CAUSES. — *a.* The *antecedent* or *predisponent causes of hæmorrhoids* are temperament, and constitution, age, sex, climate, and modes of living. Persons of a melancholic, bilious, or sanguineo-bilious temperament, of a plethoric habit of body, and with a veinous system prominently developed, are most liable to this disease. The remark of STAHL, that "subjectis accidere solet facilius hic fluxus sanguineo-cholericis, et sanguineo-melancholicis plethorâ affectis," is very near the truth. Owing to this predisposition, the complaint is often *hereditary*, as fully shown by HOLLER, ALBERTI, LARROQUE, MONTÈGRE, and others. It is most common in mature *age*, when the abdominal viscera are in a state of greatest activity, and the vascular system most plethoric, and, consequently, when these viscera are most liable to disorder and to vascular determination. When it occurs in early puberty, or soon afterwards, it is chiefly owing to the determination of blood to the vicinity of the rectum, often favoured or induced by excessive venereal indulgences. Hæmorrhoids seldom appear before puberty; and yet I have seen several instances of it in children. I very recently prescribed for the disease in a boy of five years. TRNKA, ALBERTI, and many of the authors referred to, adduce similar cases, most of which they impute to hereditary disposition. Authors differ as to its greater prevalence in *males* or in *females*. Much depends upon the circumstances in which the latter are placed; but it is more frequent in females about the period of the cessation of the catamenia, and afterwards, and during pregnancy, than at any other time; and these and other circumstances may render it almost, if not quite, as frequent in them as in males. M. MONTÈGRE supposes that it is more common in females in an accidental or occasional form, and in males in a regular or constant manner.

29. Climate has some influence in disposing to the complaint. Warm, moist, and miasmatcus climates are much more favourable to it than those which are dry, cold, or temperate. The former develope the bilious, melancholic, and choleric constitutions, relax the veinous system, and favour obstructions of the abdominal viscera — changes most conducive to hæmorrhoids. Much, however, will depend upon the *modes of life*, the *manners*, and the *morals* of the inhabitants. — *Habits of life* exert the greatest influence in causing

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* M. MONTEGRE has given the following classification of hæmorrhoidal complaints: —

1. *Blind or dry Hæmorrhoids* (*Cœcæ*).		
2. *Hæmorrh. with Discharge* (*Fluentes*)	White Discharge (*Albæ*), with Catarrh of the Intestines.	
	Sanguineous Discharge (*Sanguinolentæ*)	By Exhalation. By Rupture.
3. *Hæmorrh. with Tumours* (*Tumentes*)	Varicose (*Varicæ*)	Dry. Bleeding.
	Mariscous (*Mariscæ*)	Dry. Bleeding from dilated Pores.
4. *Painful Hæm.* (*Dolentes*)	Inflammatory. Nervous. Fissured.	
5. *Hæmorrh. with Constriction of the Anus* (*cum Contractione Ani*)	Indolent. — From Induration of the Tissues.	
	Painful	Spasmodic. Schirrous.
6. *Hæmorrh. with Ulceration* (*Ulceratæ*)	Superficial. Fistulous.	
7. *Hæmorrh. with Prolapsus* (*cum Procidentia Ani*)	From allongation of the internal Membrane. From Invagination of the Intestine.	
8. *Hæmorrh. with Irritation of the Bladder* (*cum Irritatione Vesicæ Urinariæ*)	With Dysuria. Strangury. Hæmaturia.	

the disease. Sedentary occupations, and indolence with luxurious nourishment, must, as Dr. J. JOHNSON remarks, either find some outlet to the superabundant fluids, or bring on a train of diseases. Hæmorrhoids and gout are the common consequences of this state of things. Many people who have led an active life for many years, on leaving off business and indulging in repose, become, for the first time, affected with piles. The sitting posture, retained for many hours in succession or habitually, particularly on warm or soft cushions; full or rich food; heating or stimulating diet, and intoxicating beverages; inordinate excitement of the sexual organs; habitual constipation, and the use of warm or irritating lavements, and strait corsets, not only predispose to, but often also directly produce this complaint. It is owing to the association of several of these causes that piles are so common amongst persons occupied at the desk, and amongst tailors and shoemakers, as well as among the inhabitants of Turkey and of other eastern countries. It has been very often remarked, that hæmorrhoids are more prevalent in spring and summer than in winter; and this appears to be the case. A disordered state of the alimentary canal and of the liver, and the suppression of other discharges, have a great influence in favouring an attack.

30. *b.* The *occasional exciting causes* are—1st, Whatever inordinately excites the rectum and lower part of the colon, particularly too large or too often-repeated doses of calomel, aloes, colocynth, black hellebore, camboge, or scammony; occasionally, also, of rhubarb, the neutral sulphates, and of any other purgative injudiciously prescribed or exerting a drastic action; the passage of acrid bile; the irritation caused by worms; many of the substances said to be emmenagogue; all the preparations of mercury in large or frequent doses; the liquor arsenicalis when thus employed; and the inappropriate use of chalybeates; — 2d, Whatever prevents the return of blood through the hæmorrhoidal veins, as constipation, the lodgment of hardened fæces in the rectum or lower parts of the colon, and repeated efforts at evacuation; torpor, congestion, or structural lesions of the liver, and obstructed circulation through the portal system; the pressure of a pregnant, enlarged, or displaced uterus, or of a diseased ovarium; and disease of the prostate or sphincter ani; — 3d, Whatever excites and determines an increased flow of blood to the sexual and urinary organs, as venereal excesses, spirituous liquors, the irritation of calculi, of cantharides, &c.; — 4th, External irritation of adjoining parts; prolonged walks in hot weather; riding in coaches, or on horses or mules without a saddle, — "Nam solet a nudo surgere ficus equo" (MARTIAL, l. xiv. epig. 86.); and the frequent application of leeches to the anus; — and, 5th, The local influence of cold or warmth, as sitting on the ground, or on stone seats or on damp cushions, and the habit of standing with the back to the fire. — Besides the foregoing, various other circumstances occasionally cause this complaint, as the more violent mental emotions, both exciting and depressing; errors of diet and of regimen; inordinate excesses of any kind; and diseases of other organs, particularly those of the lungs or liver. Hæmorrhoids are, moreover, sometimes *critical* in other maladies, especially in fevers and in inflammations of the brain, or of any of the viscera lodged in the thoracic and abdominal cavities. Owing generally to the association of several of the above causes, this complaint is very common in the upper classes of society, in both its simple and more complicated states; and hence the number of treatises which have appeared on it and its consequences.

31. IV. PROGNOSIS. — A favourable opinion of the result may generally be entertained in all the simple states of this affection, particularly when the patient is not far advanced in life, when the constitution is not in fault; and when the lungs, the liver, and brain present no tendency to disease. In other circumstances, and when the complaint is periodic, the removal of it, however cautiously effected, may be followed by serious effects, and especially by diseases of the lungs. (See § 3. 30.) In all cases, the prognosis should be founded upon a knowledge of the causes, of the form, and of the complication of the disorder. If the causes be not obviated, either the disease will return after a time, or it will be followed by a more serious malady. The extent and frequency of the discharge must always be taken into account as well as the form of hæmorrhoidal tumour. The more common variety of tumour is seldom attended by any risk, unless in the circumstances just alluded to, or when otherwise complicated, locally or constitutionally. But the varicose tumours require a more cautious or reserved opinion; for, under the most judicious management, the more prominent or distended parts of the vessels may burst by a thinning process, and occasion profuse hæmorrhage. They are, also, generally connected with more or less visceral disease or constitutional disorder. The prognosis should not be materially different from that just stated, when the complaint is complicated with *inflammation*, for some one of its terminations, as abscess, ulcerations, or fissures between the tumours, fistula, spasm of the sphincter, prolapsus or invagination of a portion of the bowel, and even permanent stricture of the rectum, may take place, however judicious the treatment may be, and occasion very great or prolonged suffering, if not imminent danger. When the complaint is connected with visceral disease, and especially with pulmonary disease, the opinion should be formed chiefly with reference to this association; and the hæmorrhoidal affection should be so managed as to prove a derivation from the internal malady, and to prevent its increase.

32. V. TREATMENT. — *A. The propriety of suppressing the hæmorrhoidal discharge* ought always to be considered when entering upon the treatment of it. CULLEN erred egregiously in considering the complaint as generally local, and in recommending a local treatment; and in this he has been too closely followed by surgical writers. This practice, as Dr. J. JOHNSON observes, of removing the disease as speedily as possible, is very well in sound constitutions; but where there is any defect in the system, or organ predisposed to disease, we should be careful in avoiding the sudden stoppage of the hæmorrhoidal movement or discharge. HIPPOCRATES observed that this complaint often protected the system from other maladies; and a similar opinion

has been offered by Stahl, Hoffmann, Alberti, Rosen, Richter, and others. This is especially applicable to persons who are liable, hereditarily or otherwise, to gout, consumption, apoplexy, palsy, or other kinds of hæmorrhage. Mr. Howship states that a gentleman, subject to periodic hæmorrhoids, was induced by a quack, and in opposition to the regular opinion, to have recourse to a strong vitriolic wash. This cured the discharge; but the patient died soon afterwards of gout in the stomach. M. Montegre adduces proofs of a number of diseases having been produced by the suppression of piles; the most common of these being fevers*, hæmorrhages, inflammations of the lungs or pleura, phthisis, apoplexy, and various other internal and organic maladies. Mr. Calvert saw gastric fever follow the application of cold water to the anus for hæmorrhoids. I was lately consulted in a case of apoplexy consequent on the stoppage of the discharge; and, some years since, in a case of fever, and in another of melancholy, from this cause.

33. *B. Constitutional Treatment.* — The oftener the hæmorrhoidal attack is renewed, the more liable will it be to recur, and the greater will be the risk of effecting a sudden cure. On this account it is most desirable to ascertain the causes of the complaint, and to remove them, as being most necessary not only to the efficacy but also to the safety of the treatment. Piles being among those diseases which it is sometimes dangerous to cure, care should be taken to distinguish those which ought, from those which ought not, to be removed. M. Montegre justly remarks, that those which are of a constitutional nature, or which the constitution, as it were, requires, are generally of long standing — sometimes from youth; or they replace some serious or habitual affection: they are hereditary, attended by well-marked indications of plethora — take place from various and opposite exciting causes, or without any obvious cause — are preceded by constitutional symptoms — are succeeded by an improved state of health, whether there be discharge or not — and, finally, are accompanied or followed by inconvenience when interrupted or suppressed: all these circumstances indicating a constitutional disorder which it is dangerous to meddle with too rashly. When hæmorrhoids are more strictly accidental, the symptoms and occasions of their appearance are different from the above, and they may be subjected to more active treatment. But even these become, after frequent repetition or long continuance, habitual to the system — often a safety valve to the circulation, and require a constitutional and cautious treatment. In most circumstances, however, of the disease, strict attention to diet, and to the state of the excretions, with stomachic or deobstruent laxatives, when there is any tendency to constipation; and with cooling diaphoretics when there is any febrile movement present, will be productive of benefit. When the secretions and excretions from the bowels are deficient, a few grains of blue pill, or of hydrargyrum cum creta, with one of ipecacuanha, and five or six of extract of taraxacum or of soap, should be taken at bed-time, and a draught, with equal parts of the compound infusions of gentian and of senna, the next morning, or a teaspoonful of either of the electuaries in the *Appendix* (F. 82. 89. 98. 790.), at night. When constitutional irritation exists, the camphor mixture, and solution of the acetate of ammonia, may be given with sweet spirits of nitre, and the inspissated juice of the sambucus; or the infusion of the tilea Europea with the subcarbonate of soda or of potash, with the extract of taraxacum. The nitrate of potash may also be given with the electuary, or in a diaphoretic or diuretic mixture. When the complaint is connected with vascular plethora, the treatment should be based upon this circumstance; and a spare farinaceous diet, an open state of all the emunctories, and regular exercise, ought to be enforced. If these be neglected, the suppression of the discharge may be followed by some one of the maladies alluded to above. In other respects, the treatment should be directed according to the peculiarities and complications of the case, as shown in the sequel; and organs evincing a tendency to disorder ought to be protected, either by allowing the hæmorrhoidal complaint to proceed, or by increasing it (§ 47.) when it is insufficient for this purpose, or by establishing other sources of irritation or of evacuation.

34. *B. Treatment of the Hæmorrhoidal Discharges.* — *a.* While the *sanguineous discharge* is moderate, returns after considerable intervals, and leaves no unpleasant effects, it is only a salutary adjustment of the constitution, attended, it is true, with inconvenience, but with more than counterbalancing advantages. When, however, it becomes excessive, it ought immediately to be restrained. Its excess should be inferred rather from the effects than from the quantity; for some persons will lose large quantities of blood, almost daily for some time, and yet be otherwise in good health. But, whenever the discharge is followed by pallor, debility, syncope, or convulsions or spasms, it ought to be arrested. Like other *hæmorrhages* (see the art. § 35, 45. *et seq.*) it may be either *active* or *passive*; and the treatment should be directed accordingly.

35. *a.* In the *active form*, vascular determination should be diverted from the rectum, by quietude and the horizontal position; by bleeding from the arm when the pulse admits of it; and by cooling drinks and diaphoretics. If these do not succeed, cupping-glasses, with or without scarificators, according to the state of the system, may be applied over the hypochondria, as advised by the ancients, or upon the loins or sa-

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* A gentleman, between fifty and sixty, who had suffered long from hæmorrhoids and prolapsus of the mucous membrane of the rectum, had remained free from the complaint for a considerable time, in consequence of using cooling astringents, &c. locally, as advised by a person who had derived benefit from them. I was called to him, and found him labouring under a most dangerous form of fever, complicated with deep jaundice, and attended by a conviction of approaching dissolution. His pulse was upwards of 120, soft, small, and weak. His bowels were relaxed, the stomach irritable, and the evacuations white. He had been attacked only the day before, and was restless and desponding. Calomel with camphor; effervescing draughts with the carbonate of soda in excess; Seltzer water with old wine; laxative enemata, and various other means, both internal and external, were prescribed according to the rapid progress of the malady. On the third night, he became delirious; soon afterwards, comatose; and, although the hæmorrhoidal discharge returned, from the use of the calomel, he died on the eighth day of the disease. Inspection of the body was not permitted.

crum. Derivatives, especially sinapisms, the terebinthinate epithem, or blisters, may be placed on these or other parts of the surface; and astringent or cold lotions, or injections, may be employed. — β. In the *passive form*, the acetate of lead with opium; the preparations of cinchona with the mineral acids, or the sulphate of quinine in the compound infusion of roses; the tincture of the muriate of iron, and other chalybeates; the balsams of Peru or of Copaiba, in large or repeated doses, or the terebinthinates, and the oil of turpentine, administered either by the mouth or in enemata, are the most efficacious means of arresting the discharge. (See art. Hæmorrhage, § 45. *et seq.*) — γ. *Plugging the rectum*, and the *actual cautery*, have been recommended in extreme circumstances. If the source of hæmorrhage is above the sphincter, a fatal internal discharge may follow from having recourse to the former of these. It is not practicable to resort to the latter, unless the spot whence the blood issues can be brought into view.

36. *b. The colourless mucous discharge* (§ 19.) from the anus, although a frequent attendant upon piles, is not necessarily so, as it may be occasioned by ascarides, &c. If it accompany internal or external tumours, and be independent of inflammation, slightly astringent and detergent injections; the internal use of the balsams, or of the spirits of turpentine, or of the balsams or terebinthinates combined with magnesia; and an occasional recourse to the stomachic aperient mentioned above (§ 33.), will generally remove it. When it is connected with inflammatory irritation, the means about to be stated (§ 42.) is most appropriate.

37. *D. Treatment of the Hæmorrhoidal Tumours.* — In all cases, the parts should be carefully examined by the practitioner, since the accounts given by patients themselves are very fallacious. Besides, the particular kind of tumour must be ascertained before the means of cure can be appropriately directed. Whether the piles be internal or external, or both, the anus should be washed with cold water after each evacuation; or with yellow soap and water, as suggested, in the course of some excellent remarks on the treatment of the disease, by Mr. Mayo. If the piles be internal, this should be done before they are returned. If they cannot be returned, or are permanently protruded, or altogether external, whatever may be their form, *pressure* is one of the best remedies that can be applied to them. After each evacuation, and having thoroughly cleansed the parts, a conical pad, or piece of ivory, made to slide along a bandage or handkerchief, should be passed between the nates, and fastened above to a cincture or belt worn around the loins, in the form of the T bandage. The pad may be provided with a concentric wire spring, the more internal coils of which rise in a conical form. This is the best external mode of employing pressure. — When the tumours are internal, and protrude at stool, dragging the mucous coat with them, or when they consist chiefly of varicose veins, a short metallic bougie, of an oval form, with a short slender neck, and a conical base to press upon the anus externally, may be attached to the bandage, carefully introduced into the rectum, and worn occasionally. Pressure will thus be made both above and within the sphincter, as well as without it. When introduced, the part of the *bougie* which rises above the sphincter being oval, varying in diameter with the peculiarities of the case, and being many times as thick as its slender neck grasped by this muscle, necessarily, from its shape, retains itself within the rectum, draws up with it the external tumours and prolapsed portion of the bowel, and presses its conical base externally against the anus, and upon the tumours or enlarged veins external to the sphincter. This combination of the *internal* with the *external method* of making pressure on the anus was introduced by Mr. Mackenzie into practice, and is often extremely efficacious in the treatment of hæmorrhoids, and of the prolapsus attending them.

38. Before having recourse to either of these, it will often be of service to wash out the rectum immediately after each evacuation, by injecting some cold or tepid water, with or without a few grains of sulphate of zinc dissolved in it; and, if the parts be painful or irritable, a little cold cream, or of a slightly anodyne or astringent ointment, or of any other most appropriate to the circumstances of the case, should be applied to the surface of the bougie, when about to introduce it. At the same time, the bowels ought to be kept gently open by any mild or cooling purgative that will not irritate the rectum. I have found equal parts of the compound infusions of gentian and of senna, with the soluble tartar, &c. taken at bed-time, the most beneficial, when the digestive organs were weak; and one or two teaspoonfuls of either of the following electuaries, or of one of those in the *Appendix* (F. 82. 98.), the most serviceable when plethora or hepatic disorder was present, or even when there was a manifest tendency to them.

No. 242. ℞ Potassæ Supertart. in Pulv. ℥j.; Sulphuris præcipitat. ʒij. — iv.; Confect. Sennæ ℥ij.; Syrup. Aurantii vel Zingib. q. s. ut fiat Electuarium molle.

No. 243. ℞ Potassæ Nitratis ʒij.; Confect. Sennæ, et Syrup. Zingiberis, āā ℥jss.; Succi Spiss. Sambuci ℥j. M. Fiat Electuarium.

39. These electuaries may be variously modified, according to circumstances; and the confectio piperis nigri may be substituted for the syrup, or the inspissated juice of the sambucus, or a small quantity of it may be taken twice or thrice daily, when there is much relaxation of parts, or in cold, languid, or leucophlegmatic habits. Aperient medicines, in hæmorrhoidal cases, should always be taken at bed-time, in such doses as to operate only once, or at most twice, in the morning. Subsequent irritation of the bowels during the day will thus be prevented, especially if the rectum be washed out by a lavement after passing a motion. When it is necessary to have recourse to the short bougie described above (§ 37.), it should then be introduced; its passage being facilitated by an anodyne or slightly astringent ointment or pomade.

40. When the tumours are internal and protrude only at stool, and when they continue, notwithstanding the use of the constitutional treatment advised above, aided by the modes of employing pressure, just described, the removal of them by an operation may be entertained; but it certainly ought not to be practised, unless it be clearly ascertained that they belong to the *first variety* (§ 9.), and never, if they present the

varicose character (§ 12.). Most surgical writers make no distinction between these tumours, and resort either to the *ligature*, or to *excision*, to remove them. Mr. COPELAND refers to several instances of dangerous and even fatal results from having recourse to the ligature; and yet Dr. J. JOHNSON, in an able review of the subject, states that he knows "that Mr. COPELAND's practice is, and long has been, almost invariably to employ the ligature;" his success by means of it entirely depending upon his drawing the thread as tight as possible, so as completely to destroy the vitality of the tumour. This is certainly the only mode in which the ligature ought to be employed, and the one in which it has been generally recommended and practised since the days of GALEN: but Mr. COPELAND only states the danger of this method, in his work; and neither advises it, nor points out the mode of performing it! LE DRAN considers that, in addition to the pain, the ligature may cause inflammation extending along the rectum to the intestines; and M. MONTEGRE objects to it for the following reasons — 1st, The operation is often difficult, and always very painful; — 2d, The tumours sometimes resist the ligature and, instead of falling off, ulcerate; — 3d, As they can only be tied in succession, the irritation produced by the first operation increases the swelling and inflammation of those remaining; — 4th, The ligature may produce all the effects of strangulation of the gut. Dr. J. JOHNSON thinks that these objections are founded on the inefficient mode of applying the ligature, and that few or none of them are valid, provided the thread is drawn to a proper degree of tightness at the beginning. I believe that even this more efficient mode is not secure from danger; that, in addition to the evils enumerated by MONTÈGRE, (*a*) inflammation of the hæmorrhoidal veins, extending even to the liver, (*b*) locked jaw, (*c*) retention of urine; and (*d*) contraction of the rectum, have in some instances resulted. It were to be wished that those who have been most in the habit of resorting to it, would state more fully than they have done, the results and the circumstances in which they confide chiefly in it. In the varicose form of the complaint, it is a most dangerous mode of treatment.

41. *c. Excision* of the tumours is preferred by LE DRAN, ABERNETHY, MONTÈGRE, COLLES, and CALVERT; whilst Sir ASTLEY COOPER and Mr. HOWSHIP are favourable to the *ligature*. Mr. MAYO advises this latter method for all internal piles; his mode of operating being the most judicious that can be followed. Sir E. HOME and Sir C. BELL recommend a combination of both methods — the excision of the tumour immediately after the application of the ligature. There can be no doubt of the danger of excision, and that it is very liable to be followed by great hæmorrhage, and by peritoneal inflammation, particularly when the tumours are formed by varicose veins. Numerous cases illustrative of the fatal or dangerous results of this practice are adduced by several of the authors referred to. When the piles are external, are covered by skin, and are formed as described, when considering the first form of tumour (§ 9.), excision is preferable. But I believe, from considerable experience, that either operation will be very seldom required, if the medical treatment be judiciously conducted. Neither the one nor the other should be resorted to without a careful examination of the pathological relations of the case, and of the form, state, and complications, of the local affections; nor without a preliminary treatment, consisting of one or two small cuppings over the sacrum, of a regulated state of the bowels, moderate diet, and of abstinence from fermented or spirituous liquors. In nervous and irritable persons, either operation is hazardous, and should not be performed unless in urgent circumstances. Dr. BURNE states that he has seen "a person die of sympathetic adynamic fever in four days after the removal of piles by a most accomplished surgeon. The nervous system of this patient was disturbed, prior to the operation, the shock of which excited high febrile movement and delirium, soon terminating in dissolution."

42. *E. Treatment of Inflamed Piles.* — The application of leeches to inflamed hæmorrhoids is very often advised. MONTÈGRE disapproves of the practice, as it frequently draws the blood to the parts. I believe that cupping on the loins or on the perineum is more beneficial. As more or less strangulation produces or accompanies the inflammation, the tumours should be pushed within the sphincter, if this can be done without aggravating the affection; and poultices or fomentations applied. When the inflammation is abated, MONTÈGRE advises injections of cold water; but care should be taken not to lacerate the tumours by the pipe of the syringe, as serious consequences may accrue, as in the cases recorded by ZACUTUS LUSITANUS, GASSENDI, and others. The external application of lint, moistened with a cooling and anodyne lotion, or frequently sponging the parts with it, will often afford relief. Equal parts of the solution of the acetate of lead, and of laudanum, diluted with rosewater will generally answer the purpose. If this lotion is not of service, it may be relinquished for poultices or poppy fomentations. *Incisions* or punctures of the inflamed and protruded piles are advised by some surgeons. MONTÈGRE condemns the practice; and Mr. CALVERT states that he saw an instance of fatal hæmorrhage from having had recourse to it. Much more dependence should be therefore placed upon local bloodlettings in the situations just mentioned, on low diet or abstinence, and on the refrigerants and cooling diaphoretics already recommended. If the inflammation terminate in suppuration or abscess, poultices or fomentations, and as early an external outlet to the matter as can be given it, are requisite. When tenesmus is present, cupping over the sacrum, ipecacuanha with nitrate of potash and opium, in frequent doses, anodyne fomentations, and the treatment about to be prescribed for this symptom (§ 46.) are most serviceable. The bowels should be kept gently open by means of castor oil, the aperient electuaries, and other laxatives mentioned hereafter (§ 46. *c.*).

43. *F. Treatment of Ulcerations, Fissures or Cracks.* — *a.* When *ulcerations* form between the tumours, or on their surfaces, the parts should be carefully cleansed after each evacuation, and an ointment, with a small proportion of Peruvian balsam may be applied to it, by a pledget of lint; or any other ointment of an astringent and anodyne kind may be tried. The balsams or terebinthi-

nates should be given internally, in the form of pill, with magnesia, in quantity sufficient to keep the bowels gently open.

44. *b. Fissures* or *cracks* between the tumours are attended either by exquisite pain, or by spasmodic constriction of the sphincter. More frequently both these latter morbid states are present; and occasionally the patient is tolerably free from both. When the lesion is thus simple, the treatment recommended for ulceration will often be sufficient; the local application of borax dissolved in honey will also be of service, as a substitute for an ointment; but when either pain or spasm of the sphincter is complained of, other means are required. In these cases I have found the addition of the extract of *belladonna* to any of the ointments usually prescribed give almost immediate relief. If a large proportion of the extract be employed, the effects ought to be carefully watched. Due attention to the functions of digestion and of excretion, and to existing constitutional symptoms, is always necessary. In less severe cases of this description, the extract of hyocyamus may be tried, before having recourse to the belladonna. M. BOYER and most surgeons in this country have advised a complete division of the sphincter ani muscle for the removal of this complaint. I have treated five cases of fissured anus since 1822, when the first came under my care. In all these the operation had been recommended; and yet they perfectly recovered in a short time, and without a single exception, by means of a purely medical treatment. Strict injunctions as to diet and regimen; the daily evacuation of the bowels, and afterwards washing out the rectum by emollient injections; careful ablution of the external parts, and the application of an appropriate ointment or cerate with belladonna; attention to the functions of the digestive and assimilating organs, and to constitutional symptoms, and the removal of general or local plethora, constituted the treatment. The belladonna was added to various kinds of ointment, according to the peculiarities of the case. In all it affected the pupils, and in two, it produced its characteristic eruption on the skin. Several years after I first employed this medicine for fissure with painful spasm of the sphincter, the account of M. DUPUYTREN's treatment of this affection by the same means appeared in the medical journals of Paris.

45. *G. Hæmorrhoidal pains and spasmodic stricture of the rectum,* generally connected with fissure or ulceration at the bases of the tumours, must be treated in the manner just stated (§ 44.). The pains are often intermittent, but very acute, during their continuance. Sometimes they extend down to the feet and ankles, and even occasionally assume a neuralgic character in these or other parts of the lower extremities, or give rise to spasm in various parts, especially in nervous or hysterical females. Some interesting instances of such affections have been recorded by Sir B. C. BRODIE, and have been observed by myself. In such cases, much benefit will generally accrue from taking the confectio piperis nigri, twice or thrice daily; and from adopting the constitutional and local treatment just recommended. This medicine may also be conjoined with an anodyne, and the bowels regulated by the medicines already suggested. M. MONTÈGRE strongly advises having recourse to the "*douche ascendante;*" or the forcible dashing of cold water against the anus, and to cold injections. In order to render the evacuation more easy, he directs the lavement to be thrown up when the inclination to stool takes place. Emollient injections may also be tried, either to facilitate the discharge, or to cleanse the rectum afterwards; and *suppositories* with the ceratum plumbi compositum, and opium, or stramonium, or belladonna, or any other narcotic may be occasionally introduced into the rectum, and they will seldom fail of giving relief. Great care ought to be taken in the administration of narcotics in lavements in the treatment of this or any other state of the complaint as they are often rapidly absorbed into the circulation, from the rectum and colon, and without having undergone any change. I have known half a grain of the belladonna, in one case, and thirty drops of laudanum in another, produce the most serious effects. When, however, either of these, or any other narcotic is prescribed in an ointment, pomade, or suppository, no unpleasant results will follow.

46. *H. Tenesmus, strangury, and constipation* often depend upon the same pathological states. — *a. The tenesmus* is generally owing to inflammatory irritation and congestion of the inner coats of the rectum, conjoined with spasmodic action of the muscular tunic. It will, with few exceptions, be removed by the means just directed (§ 42. 45.). In less acute, or more obstinate cases, the belladonna plaster may be applied to the perineum or sacrum. Five or six grains of the extract of poppies, or one or two drachms of the syrup, may also be occasionally thrown into the rectum, with any tepid emollient enema; or a suppository of the kind just stated may sometimes be introduced. — *b.* If *strangury* or *dysuria* supervene, it is to be imputed to the extension of the affection of the rectum to the neck of the bladder, or to the prostrate and urethra; and it will generally be found that it will be removed or relieved by the treatment recommended for tenesmus. — *c. Constipation* also frequently proceeds from the same local changes as occasion tenesmus and strangury, and from tumours or enlarged and congested vessels obstructing the canal of the intestine. In either case, there is more or less obstacle to the passage of a consistent motion, and much pain attending it. If these symptoms be allowed to continue, the complaint will be aggravated; or they will give rise to still more serious changes. In removing them, the milder laxatives will be found more serviceable than active purgatives; but those which act also upon the liver should be selected. Mercurials aggravate and even bring on tenesmus, and therefore cannot be employed, with the exception of hydrargyrum cum creta. This may be taken in small doses at bed-time, with ipecacuanha and hyoscyamus, or with extract of taraxacum. Some one of the electuaries already prescribed (§ 38.), or the decoction of taraxacum with the subcarbonate of soda, or the tartrate of potash with tincture of senna and syrup of roses, or of senna may be given, and continued for some time. A Seidlitz powder taken about an hour before breakfast is also one of the best aperients in hæmorrhoidal cases. A frequent recourse to warm lavements is injurious in this complaint, as they relax the parts, and solicit the circulation to them.

M. Montègre, whose authority in this matter is very high, advises the injection of cold water in preference, as it strengthens the bowel; but he directs no more than will fill the rectum (about half a pint) to be thrown up. In the more severe states of the disease, especially in cases of fissure, of spasm of the sphincter, and of painful evacuation, he considers the cold injection, every time that a motion is about to be passed, most beneficial.

47. *I. Re-establishment of Suppressed Hæmorrhoids.*—When the suppression or interruption of piles is followed by aggravation of some related complaint; or injures the general health; or threatens some important organ, as the lungs, brain, liver, &c., there ought to be no hesitation as to having recourse to means calculated to reproduce them. A gentleman of about fifty, residing near Russel Square, subject to returns of humoral asthma often passing into bronchitis, as well as to frequent attacks of hæmorrhoids, experienced great aggravation of the former, in 1835, after the latter had disappeared for some time. I directed him to be cupped, but he neglected to adopt my advice: I therefore prescribed a full dose of calomel and aloes, and repeated it in a few hours, with the view of restoring the suppressed piles. This had the desired effect; but severe inflammation of the tumours and strangury supervened, followed by an abscess between the prostrate and anus. This broke externally, and soon healed; and the patient has not been confined a day since. Another gentleman, between fifty and sixty, had experienced severe headachs from the non-appearance of the hæmorrhoidal discharge. He was advised, in 1829, when I saw him, to lose blood; to live abstemiously, and to relinquish malt liquors. The first only of these injunctions was complied with, and his complaints returned. The same advice was again given, and the purgatives formerly prescribed were changed to those which act more energetically on the rectum. The hæmorrhoids were reproduced, and the headachs disappeared. Such instances are, however, not at all uncommon. Unless in urgent cases, it will be preferable to attempt the restoration of piles by the more gentle means at first, as the exhibition of those which are most irritating, before the action of milder remedies is ascertained, may excite inflammatory action, of a very severe kind, and great distress, as in the case first adduced. A reference to the causes which commonly occasion the complaint will show the means most likely to reproduce it. The most appropriate, however, are pediluvia or semicupia; the hip-bath; the application of leeches to the anus; the use of purgatives which act especially on the rectum, as calomel and other mercurials in full doses; aloes, colocynth, rhubarb, sulphate of soda, &c.; warm injections; aloetic enemata, &c.

48. *K. Of Regimen and Prophylaxis.*—An abstemious regimen is required during the attack, and is even more necessary in the intervals; for it is chiefly by diet, and prudent conduct, at these times, that this complaint, and its contingent ills, are to be warded off. A temperate climate is best suited to persons liable to hæmorrhoids; but sudden vicissitudes of weather are unfavourable, and should be guarded against, by wearing flannel next the skin, and by warm clothing. Malt and spirituous liquors ought to be avoided; and temperance in food and drink should be observed. Too warm and soft beds are improper; and sitting on soft warm cushions is still more so. Regularity in the hours of eating, sleeping, waking, and taking exercise, is generally of service, and when medicine is requisite, it should be such as will correct morbid action, increase scanty secretion and excretion, particularly of the biliary and mucous surfaces, and preserve the bowels regularly and gently open. Cold ablution of the anus, after each motion, and, if hæmorrhoidal tumours protrude, the careful sponging of them before they are returned, will not only remove disorder, but prevent its return, if continued without interruption in winter as well as in summer. Venereal excesses, the more violent mental emotions, and all the depressing passions, are injurious. Exercise in the open air, especially on horseback, is always of service if taken regularly, although rough-riding, especially by those who are not accustomed to it, is often a cause of the complaint. — (See also Rectum — *Diseases of.*)

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HAIR — ALTERATIONS OF.

CLASSIF. — GENERAL PATHOLOGY — *Symptomatology* ; *Ætiology* : — SPECIAL PATHOLOGY, and THERAPEUTICS.

1. The hair being an appendage of the skin, and the natural covering of one of the most important parts of the body, material changes in its state or appearance are interesting to the medical practitioner, as furnishing indications of several pathological conditions. Nor is the growth or removal of the hair devoid of importance, especially in certain diseases, and in convalescence from dangerous maladies. The various alterations presented by the hair are rarely primary or idiopathic, and seldom even depend upon local changes merely; but are usually the more remote consequences of debility and chronic disorder of the digestive organs, frequently associated with superinduced affections of the skin and of the pilous follicles, and occasionally also with general cachexia. In many instances where the hair undergoes a marked change, the nails likewise present more or less alteration.

2. I. EFFECTS OF REMOVING THE HAIR.— The consequences of removing the hair depends, 1st, upon the quantity of hair removed from, and left upon, the scalp; 2dly, upon the states of the system and of the circulation in the head at the time of removal. When a person is in good health at the time, little further results from cutting off the hair than headach, cold in the head, or earach, or sore throat. M. JOURDAN states, that when the long hair worn by the soldiers in the revolutionary war was cut off in all the regiments, many complained of headachs of several weeks' continuance; but he was not aware of any fatal effect being produced. The removal of the hair in cases of inflammatory excitement of the brain, or in that sthenic state of vascular action which requires having recourse to cold applications or the cold affusion, can seldom be productive of injury, although it seems very doubtful if it be so beneficial as is very commonly supposed; but it is very different in other circumstances. In adynamic, nervous, low, or typhoid fevers, or in exanthematous fevers presenting these characters—and still more especially during early convalescence from these, the removal of a large quantity of the hair very close to the scalp sometimes aggravates the symptoms. During the advanced stages of these diseases, the circulation in the scalp, and the perspiration from it, are checked, and congestion, or even serous effusion, is either thereby favoured, or induced, or increased. Therefore, in these low states of action and of vital power, the hair should not be shaved or closely cut from the scalp, unless when a blister is about to be applied in this situation. During convalescence from these or other dangerous maladies, the early removal of the hair, particularly when long or thick, is not without risk. SEGER, VASSAL, LANOIX, ALIBERT, JOURDAN, and others, have met with dangerous and even with rapidly fatal effects from this measure. The risk from it is great in proportion to the quantity of hair removed, and of the perspiration proceeding from the scalp. I have seen, in several instances, ill effects follow the removal of long thick hair from the heads of delicate children and females. In children thus constituted, the hair should always be kept short; and, if it be allowed to become abundant, it ought not to be closely cut at once. Whenever much hair is removed, a warm covering to the scalp should be immediately substituted, and worn for some time afterwards. Persons strongly constituted, and taking regular exercise in the open air, may not experience any disorder from the neglect of this precaution; but the weak, or the exhausted, or convalescents, will generally suffer if they act contrary to this advice.

3. Persons in the habit of wearing long *beards*, have often been affected with rheumatic pains in the face, or with sore throat, upon shaving them off. In several cases of frequently recurring, or of chronic sore-throat, wearing the beard under the chin and upon the throat has prevented a return of this complaint.

4. On the other hand, the *removal of the hair*, or keeping it closely cut, is often productive of

good effects: I have seen it of service in headachs. Frequent cutting promotes the growth of the hair, and admits of the usual operations of brushing and combing acting more efficiently on the scalp. In cases requiring cold sponging, the shower-bath, &c., shortness of the hair is an advantage. Morgagni (*Epist.* viii. *Art.* 7.), Grimaud, Richerand, and others, have adduced instances of recovery from mania, headachs, and various nervous affections, by keeping the head closely shaved. Whether the hair has any influence or not in retarding the passage of positive electricity from the body, or in otherwise affecting the electro-motive or galvanic actions taking place in the system, it is difficult to determine; but it seems very probable that it has.

5. II. Of Excess of Hair.—*A. General excess of hair* is not often seen. I knew two persons whose bodies were so thickly covered with hair, excepting the parts of the face, hands, and feet, that are usually devoid of it, as nearly to prevent the skin from appearing through it. Both were remarkable for strength and endurance; and in both the hair was dark brown. Their joints were small, the muscles uncommonly developed, and the adipose and cellular tissues scanty.—*B. Partial excess of hair, or the growth of hair in unusual parts — Extraneous hair — the Trichosis hirsuties of* Good — is very common. The most frequent examples of it are in sterile women, who often have more or less of a beard after they pass the age of thirty. Since Hippocrates, growth of the beard in females has been imputed to deficient menstruation; but there are very numerous exceptions to this. Dr. Good states that one of the most striking cases he ever observed was in a woman who was subject to excessive menstruation, and who died at forty. The growth of hair on the upper lip is sometimes seen in young, as well as in aged women; and, either on the chin chiefly, or on both the chin and upper lip, is often met with in females about or after the change of life, and occasionally even in those who have had several children. — *a.* Tufts, or *patches* of hair, in situations where none is generally seen, have been frequently met with. When the patches are small, they have been usually denominated *nævi pilares*, or hairy nævi. In rare instances, however, they have been remarkably large. Cases are adduced by Rayer, Grivet, Bichat, Dufour, and others, in which these patches covered a large portion of the surface of the body, were of a brownish hue, somewhat elevated above, and quite different from the colour of, the surrounding skin.

6. *b.* The hair also, in its natural situations, may acquire a remarkable length. This is not a rare occurrence as respects the hair of the head; but it is very seldom met with in other places. Brückmann saw the hair of the head reach the ground; and Otto refers to an instance of the pubic hair of a female being an ell and a half long. The premature growth of hair in natural situations, as on the pubis, chest, &c., has been sometimes seen, especially in connection with the too early developement of the genital organs. Several instances of this kind are on record.

7. *c.* The growth of hair *on mucous membranes* has been met with in rare instances; in different parts of the digestive mucous surface (Walther, Otto, Villerme, &c.), of which various cases are referred to in the *Dictionary of Medical Sciences* (vol. vii. p. 37. *et seq.*), in the gall-bladder (Bichat), in the uterus and vagina, (Meckel, &c.) and in the urinary bladder (Cruveilhier, &c.). But it is extremely doubtful that the hair was developed in some of the situations where it has been found, as no information, in most of the cases, is given as to its roots. It is more probable, therefore, that it was introduced from without, or had accidentally passed into these situations.

8. *d.* The development of hair in the *interior of cysts* is more common, and has been more accurately observed. These cysts have been most frequently found in the ovarium, in the substance of the uterus, below the skin, and in various other parts. They seldom contain hair only, but more frequently also fatty matter, bones, teeth, &c. The hair is sometimes attached to the interior of the cysts, but it is more frequently entirely detached. It would appear, from the observations of Warren, Tumiati, Bosc, Schacher, Meckel, and others, that it is formed from roots or bulbs, as in the skin; and that in consequence of an alteration in these, it often becomes entirely unconnected with the surface from which it was formed. The researches, however, of Tyson, Morand, Bichat, and Cruveilhier, do not confirm this view, as, in the cases they met with, the hair was not attached at one of its extremities, either to the cyst, or to the other matters which the cyst contained. From the circumstances of these cysts being found most commonly in the ovaries, their formation has been imputed to an imperfect or unaccomplished coition. The fact that they have been sometimes met with in the ovaria of females, who had not reached puberty, or in whom the hymen was unruptured, has been considered to militate against this mode of accounting for their formation. But this objection to the doctrine is not valid; as it merely shews the impossibility of complete coition having taken place, and is no proof that the act has not been attempted.

III. Morbid States of the Hair.—Classif. —6. *Class*, 3. *Order* (*Good*). IV. Class, IV. Order (*Author*).

9. i. The hair of the head may become weak and slender, and may split at the extremities—the *Trichosis distrix* of Good, or *forked Hair*. This is a very common affection, and depends upon a deficient action of the bulb of the hair, in consequence of debility, or impaired vital power, frequently connected with weakened digestion and assimilating function.

10. ii. The hair is sometimes *rigid*, *crisped*, and *hard*. It is then usually very short and rough, and harsh to the touch. This state seems to depend upon a deficient secretion of oily matter, by which the hair is covered and protected. It is more rarely *bristled — Trichosis setosa of* Good. This alteration is noticed also by Plenck, but in a loose and unsatisfactory manner. Of the *crisped* and dry state of the hair, I have seen some instances; of the bristled, I have not known even of a single case.

11. iii. The *Treatment* of these states of the hair consists in frequent cutting, and in the use of the local applications advised for loss of hair (§ 32.), more particularly the ointment prescribed at that place. Attention should also be paid to the digestive, assimilating, and excreting functions; as

I have never seen either of those affections of the hair unconnected with disorder of these functions.

12. III. FELTING OR MATTING OF THE HAIR — *False Plica.* — The long hair of persons, who have neglected it, frequently becomes felted, or inextricably interlaced. Females after long illnesses are subject to it, particularly in Poland, and other countries where cleanliness in respect to the head is so much neglected. It is somewhat favoured by a morbid secretion from the scalp, and is occasionally met with in connection with *porrigo favosa* and other chronic affections of this part. It has been particularly noticed by DAVIDSON, KREUZER, BOYER, GASC, and other writers on *Plica*, and been confounded by many authors with that disease. JOURDAN and RAYER have, however, pointed out the great differences between them. Felting of the hair occurs independently of any alteration of the hair itself or of its bulbs, and without the constitutional and local disorder ushering in or attending *plica*. (See § 34.) — The remedy for it is obvious.

IV. LOSS OF COLOUR OF THE HAIR. — SYN. *Canities;* Πολιότης, πολίωσις, (from Πολος, white, hoary); *Trichosis poliosis,* Good; *Canitia,* Auct.

13. DEFIN. *Hairs prematurely grey, hoary, or white.*

14. i. HISTORY.—Loss of colour of the hair may be accidental, premature, or senile; and it may be partial or general. The hair begins to be grey first at its free extremities; but it often changes in that portion which is nearest the skin. This latter circumstance shows that the hair has been first secreted of its natural colour, and afterwards secreted grey or white, in consequence of an affection of its bulbs, and is frequently observed when the loss of colour has been preceded by *eczema*, or any other chronic affection of the scalp. Men usually begin to get grey about forty, many between thirty and forty, and some not until a more advanced age. The occurrence of gray hairs in persons under thirty is not rare; and I know two individuals, one a male, the other a female, considerably upwards of seventy, who have thick dark hair, without any being grey. The hair of the head is that which first loses its colour from age, the change usually commencing on the temples. The white hairs are at first few, but they soon multiply. When they fall out, they are seldom reproduced, so that baldness often follows canities. Females generally retain the colour of their hair longer than males, and the fair longer than the dark; but fair hair often falls out at an early age.

15. Canities, either partial or general, is very rarely congenital, or observed in childhood. The very fair, or almost white hair, with which fair children are sometimes born, is not the change under consideration. Greyness of parts only — in tufts — has been often noticed, and is owing to some affection of the scalp in those parts. This partial loss of colour may occur on the head, in the beard, or in other situations. Instances of this kind, and of the change taking place on one side only, have been recorded by LORRY, LUDWIG, HAGEDORN, RAYER, and others, and are by no means rare. Loss of colour of the hair commonly is gradual and slow; but in some cases the change has taken place in a few hours, or in the course of a single night. The case of Mary Queen of Scotland has been often adduced, and others are mentioned by VOIGHTEL, BICHAT, CASSAN, and RAYER. When hair grows from cicatrices without pigment, it is colourless; and in general or partial leucopathia, the hair is white or grey in most instances. In senile canities, however, the scalp seldom participates in the loss of colour.

16. ii. CAUSES. — *A.* The *remote causes* of premature canities are — disappointments, anxiety of mind, extreme or protracted grief; unexpected and unpleasant intelligence; fear, fright, or terror; great mental exertion; paroxysms of rage or anger; severe, repeated, or continued headachs; rheumatism of the head and toothach; the salts from the evaporation of salt-water from the hair; eczema and other chronic eruptions of the scalp; over indulgence of the sexual appetite; excessive hæmorrhage or other discharges, mercurial courses, and an hereditary predisposition.

17. *B.* Blanching of the hair appears to *arise from* a diminished secretion of the colouring matter by the bulbs or follicles. Dr. MACARTNEY thinks very justly that an organic action must be admitted to exist in the substance of the hair, in order to account for the changes to which it is subject, and which sometimes takes place so rapidly as otherwise not to admit of explanation. M. RAYER states, "that grey hairs have been said to be without *marrow* or matter in their interiors, in place of which there is an empty canal." VITHOF says that the bulbs of those hairs which have become white are somewhat atrophied, and Dr. MACARTNEY thinks that the change is owing to the absorption of the colouring matter when it takes place rapidly.

18. iii. TREATMENT.—When canities is the result of age and of partial or general leucopathia, it cannot be made the subject of medical treatment. But when it is partial or depends upon chronic inflammation of the scalp having extended to the bulbs of the hair, the removal of this state, and of the white hairs, is sometimes followed by the production of hairs of the natural colour. Various means of dyeing the hair have been resorted to; but these are unworthy of notice. Applications to the hair, with the view of preventing it from becoming grey or falling off, have been frequently employed. Amongst these, the prepared marrow of the ox or deer, bears' grease, honey-water, and substances mentioned hereafter (§ 32.), are most deserving notice.

V. PRETERNATURAL COLOUR OF THE HAIR.— SYN. *Miscoloured Hair; Trichosis Decolor,* Good.

19. The hair may be changed from a very light to a very dark colour. Instances of this have been adduced by ALIBERT and others, and are not infrequent. It may be also changed to a reddish yellow, and even to green or blue. It has likewise been observed of a spotted or variegated hue; this, however, is not uncommon. Hair that has become grey has, in very rare cases, been changed to black. The instances in which the hair has been said to have been green or blue have most probably arisen from the action of metallic fumes on hair of a light colour. The subject is more fully discussed by M. RAYER, but it is not deserving of further notice.

VI. THE WANT OR LOSS OF HAIR.—SYN. *Alopecia;* Ἁλώπεκια (from ἀλωπηξ, a fox), Galen; *Area,* Celsus; *Gangrena Alopecia,* Young;

Alopekia, Swediaur; *Defluvium Capillorum*, Sennert; *Fluxus Capillorum*, Auct. var.; *Der Kahlkopf*, *Kahlheit*, Germ.; *Chauveté*, *Calvitie*, *Alopécié*, Fr.; *Calvezza*, Ital.; *Baldness*.

20. Defin. — *The defect or loss of hair, either limited to one or more parts only, or diffused and more or less general.*

21. Alopecia may be *congenital*, and is then owing to the tardy development of the hair; which often does not appear until the end of the first or second year. This form of baldness is, however, very rarely permanent. If it is, the circumstance is to be imputed to the absence of the follicles.

22. *Decay* of the hair may take place in various states of the scalp and of the constitution. It may occur either prematurely, or as a consequence of age. In the former case it is the result of disease, and is either *limited* — partial, but complete, as far as it extends — or *diffused*, and more or less general: in the latter it is always *diffused*, and depends upon the change which the integuments of the body undergo at that period of life. I shall consider, *first*, limited or partial alopecia; and, *secondly*, diffused alopecia; this latter comprising, (*a*) Premature loss of hair, and (*b*) Decay of the hair from age.

i. Limited or partial Baldness. — Syn. Ὀφιασις; (from ὄφις, a serpent); *Ophiasis*, Celsus; *Area*, Auct. var.; *Alopecia Areata*, Sauvages; *Porrigo Decalvans*, Willan, Bateman; *Trichosis Area*, Good; *Alopecia partialis*, *Alopecia circumscripta*.

23. Charact. — *Bald patches often without decay or change of colour of the surrounding hair, the bared spots being shining and white, frequently spreading or coalescing.*

24. Partial alopecia is the consequence of various alterations of the secreting follicles of the hair induced by impetigo, fevers, chronic eczema, sycosis, &c. The variety described by Willan, under the name of *Porrigo decalvans*, is the most remarkable which comes under the present head. The scalp, or skin of the chin or cheeks of persons affected with it, presents one or more patches, frequently of a circular form, entirely devoid of hair, although surrounded by that of the natural growth. The skin of these patches is smooth, without redness, and unusually white; and their areas extend gradually. When several exist near each other, they ultimately unite. A large portion of the scalp may be thus denuded of hair. Neither vesicles nor pustules, nor any other kind of eruption can be detected in the surface of these patches. This affection occurs commonly in the hairy scalp, and in children; but it is not infrequent in adults, and in the beard. In *children* it often assumes an irregular serpentine or winding form. I have seen it in them associated with various disorders of the digestive organs, and occasionally with those of the brain; but it has also been apparently independent of any internal affection. Dr. Elliotson has seen it in a child with disease of the brain (*Lond. Med. Gaz.* vol. vii. p. 639. and v. viii. p. 30.) The cases which I have met with in adults were not connected with any other disorder. I agree with Good, Rayer, and Todd, in viewing it as a variety of alopecia, and entirely unconnected with porrigo.

25. A variety of partial alopecia has been noticed by MM. Mahon and Rayer, that differs from the preceding chiefly in the appearance of the affected surface, and in the presence of a few altered and brittle hairs. In this latter respect, it nearly approaches the morbid state of the hair already mentioned (§ 10.). On one or more circular patches, the hair seems broken off to within a line or two of the skin. The surface of the patches is dry, appears rough to the eye, and feels more so to the touch. It is slightly bluish, and a fine white powder can be detached from it. The affection begins at a point, and spreads; similar spots forming in the vicinity of the one which first appeared. These may extend until nearly all the scalp becomes affected.

ii. Diffused Alopecia. — Syn. *Calvities*, *Depilatio*, *Defluvium Pilorum*, Auct. var.; *Trichosis Atherix*, Good.

26. Charact. — *The decay or fall of the hair occurring in a diffused or general manner; the hair becoming gradually thinner, commonly at first on the crown, or on the forehead and temples.*

27. Decay of the hair in a gradual and diffused manner may take place prematurely, and as a consequence of disorder of the digestive organs, or of the constitution, or of a local affection of the scalp extending to the pilous follicles. It is often an indication of premature exhaustion of organic nervous energy. — *Congenital absence*, or defective development of the hair of a permanent kind (§ 21.) has been rarely observed. Instances of it have been recorded by Heister, Danz, Wells, and Rayer. Premature loss of hair is not confined to the scalp, but often extends to the eye-brows, beard, and other parts of the body. It may be even general. Mr. South (*Translation of* Otto's *Pathology*, p. 120.) mentions a case most probably of this kind. A total loss of hair, however, is more common than general defective development of a permanent kind; and is met with chiefly in mature or far advanced age. J. P. Frank saw it in a young man; and instances of its sudden occurrence are recorded by Paulini, and Heister, and in the *Journal de Physique* (t. xiv.), and in the *Berlin Medical Transactions* (t. iii. p. 372). Most commonly the hair of the head, of the axillæ, and pubes, gradually and successively fall off. In rare instances the hair has been renewed of a finer quality, as in the cases recorded by Lemery and Bonina (*Journ. des Progrès, &c.* t. xiv. p. 244.) A singular case of baldness confined to one side of the body is related by Ravaton.

28. Causes. — *A.* The *remote causes* of baldness are — 1st, Whatever debilitates and exhausts the system, as profuse or prolonged discharges; dangerous hæmorrhages; masturbation, or immoderate indulgence of the venereal appetite; low, typhoid or adynamic fevers; care and disappointments; the depressing passions and anxiety of mind; excessive application to study; the contact of rancid, septic, or putrid animal matters with the scalp; more rarely the syphilitic poison, and the frequent or prolonged use of mercury. It may also be caused by exposure to the sun's rays, by the fumes of quicksilver, by the friction of a military cap or helmet, by eczema or other chronic eruptions of the scalp, and by the use of tobacco. It has been said to be endemic in some places. Leo Africanus has stated, that baldness is com-

mon in Barbary; Tournefort, that it is almost universal in Mycone, one of the Cyclades; and Sir R. Sibbald that it was frequent in Shetland in his time, owing to the fish diet of the inhabitants. That living chiefly on fish, and on poor unwholesome food may aid in its production, is not improbable. The salts of sea-water left in the hair will sometimes cause it indirectly. Extreme distress of mind has produced a general loss of hair within twenty-four hours; but such instances are extremely rare. Since Hippocrates, it has been said that eunuchs do not become bald; and Schenck remarks, that baldness does not commence, until after the generative functions are exercised. It is certainly much less frequent in females than in males.

29. History and Pathology. — *A*. The fall of the hair may take place in a few days, or even in a shorter period; or so slowly as to escape observation. The skin of the denuded part usually presents the ordinary appearance, especially in senile alopecia. In some cases, it is pale, or of dead whitish colour, and furfuraceous; and occasionally it is covered by scurf, or scales, and is distinctly inflamed. In the former case, its sensibility is not materially altered; in the latter there are heat, itching, or pricking. The hair is often more or less altered before it falls out, being thin, harsh, dry, weak, and stunted, or deprived of colour. This is most frequently the case when it proceeds from causes acting directly on the scalp, and from chronic eruptions of this part.

30. *B*. Loss of the hair proceeds from changes in the bulbs: — 1st, From atrophy or wasting of the follicles, as in senile alopecia, and in that state of the affection which is produced by excessive venereal indulgences; — 2d, From an impaired or suspended vital action of the pilous follicles, as in the alopecia that takes place suddenly or rapidly from mental emotions, &c.; in that which follows malignant adynamic or putrid fevers; and in that variety which has generally been known by the name of porrigo decalvans, — and, 3d, From chronic inflammation, extending to the bulbs. Equally important with a knowledge of the particular condition of the follicles or bulbs to which the loss of hair is to be imputed, is the investigation of the affections with which it is related, or upon which it is dependent. Although alopecia is often a strictly *local* and *primary* affection, proceeding directly from local causes, yet it as frequently depends upon disorder of the digestive and assimilating organs, and upon the general state of the system. As Dr. T. J. Todd justly remarks, it may arise not only from a change primarily induced in the follicles, but also from the extension of disease to them from the tissues in which they are situate. In this latter case, the alopecia may be also *local*, but it is *consecutive*, the follicles being altered by becoming involved in the inflammation constituting an adjacent cutaneous disease. The baldness following eczema, porrigo, impetigo, &c. is an illustration of this.

31. *C*. Alopecia is most frequently *symptomatic* of debility or cachexia, produced by the exhausting causes enumerated above (§ 28.). After fevers, the hair is generally exfoliated with the cuticle, and sometimes even with the nails; but as the follicles have their vital actions restored, the hair is reproduced. When, however, the hair falls out in phthisis, diabetes, and other cachectic maladies, no attempt at restoration takes place. Alopecia may also be symptomatic of chronic inflammation of the digestive mucous surface. Indeed, this is a frequent cause of it. The connection of this state of the digestive organs with chronic cutaneous eruptions is fully established and well known; and the pilous follicles are sometimes the parts of the integuments affected thus sympathetically; the affection implicating them either principally or solely, or in conjunction with other parts of the skin. This dependence upon, or connection with, derangement of the digestive and even of the biliary functions should never be overlooked in practice; for, although I cannot agree with Broussais and his followers, that the external change is produced by the internal inflammatory irritation, or that the internal complaint is so generally inflammatory in its nature as they would make it appear, yet I am convinced that there is a very close connection often existing between the internal and external affection; both affections generally proceeding from, and being associated by, the same pre-existent disorder; which disorder may generally be referred to the state of organic nervous function or power.

32. Treatment. — *A*. In *limited* or partial alopecia, more particularly that variety usually called porrigo decalvans, and in all those cases that appear independently of inflammatory action — that depend upon the first and second pathological states enumerated above (§ 30.) — stimulation of the parts, by the decoction of walnut-tree leaves, or of the leaves of the solanum, — by the infusion of rosemary, or of the lesser centaury, or of mustard seed, — by various spirituous and aromatic washes, — by ointments containing the tincture of cantharides, or some essential oils, — or by embrocations of thyme, lavender, the juice of onions, of garlic, &c., has been very generally recommended. M. Rayer, however, does not consider this practice very successful. Dr. Willis has seen the common mercurial ointment prove of service. The balsam of sulphur, applied to the scalp, is praised by Ruland; a solution of the sulphate of copper in spirits, by some recent writers, and blisters by Arndt. I have seen a strong solution of the nitrate of silver, in some instances, and either an infusion of capsicum, or ointments with the tincture, in others, applied to the affected surface, and persisted in for some time, restore the hair. Dupuytren generally prescribed an ointment with a strong tincture of cantharides. I have, in several cases of baldness, of the kind under consideration, employed an ointment containing the balsam of Peru with complete success. It has the effect of rendering the hair thick and persistent, and in promoting the growth of it in parts from which it had fallen out from impaired action of the follicles. The following is the formula that I have usually employed.

No. 244. ℞ Adipis Præparatæ ℥ij.; Ceræ Albæ ℥ss.; lento igne simul liquefac, tum ab igne remove, et, ubi primum lentescant, Balsami Peruviani veri ʒij.; Olei Lavandulæ ♏ xij. adjice, et assiduè move donec refrixerint.

33. When alopecia proceeds from eczema, impetigo, fevers, &c., the treatment should be entirely directed to the removal of these eruptions. When this is accomplished, and the skin remains dry, tense, or furfuraceous, the part should

be shaved, and the surface anointed with the above ointment, or with some substance of a similar nature, as an ointment with the oil of mace, &c. The tincture or infusion of tobacco, as recommended by ZACUTUS LUSITANUS, and often empirically resorted to, will also be of service in this and in some other states of the disorder. In every form of the affection, the digestive, assimilating and excreting functions should be regulated or assisted; and associated internal congestions, or inflammatory irritations removed by appropriate means. Alopecia, as well as premature greyness of the hair, is often caused by disorder of these functions, and associated with these internal diseases; and neither the one nor the other can even be retarded in their progress, unless the treatment be directed with a strict reference to these pathological connections.

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VII. TRICHOMATOSE HAIR. — SYN. *Τρίχωμα*, *Plica Polonica*, *Plica Polonica Judaica*, Auct. var.; *Plica Saxonia*, Linneus, Vogel; *Plica Belgarum*, Schenck; *Trichoma*, Manget, Sauvages, Cullen; *Lues Sarmatica*, *L. Polonica*, *L. Trichomatica*, Auct.; *Tricæ*, *Tricæ incuborum*, *T. Scroforum*; *Cirragra*, *C. Pollonorum*; *Affectio Sarmatica*; *Helotis*, Agricola; *Ecphyma trichoma*, Young; *Trichosis Plica*, Good; *Plica*, Rayer; *Plica Cachectica*, Author; *Weichselzopf*, *Iudenzopf*, Germ.; *Gwozdziec*, Pol.; *Plique*, *P. Polonaise*, Fr.; *Plica Polonica*, Ital.; *Plicose Hair*, *Felted Hair*, *Cachectic Plica*.

CLASSIF. — 3. *Class*, 3. *Order* (*Cullen*). 6. *Class*, 3. *Order* (*Good*). IV. CLASS, IV. ORDER (*Author*).

34. DEFIN. — *The hair thickened, softened, felted, and agglutinated by a morbid secretion from their bulbs and from the scalp.*

35. The anomalous development and agglutination of the hair, occasionally observed in Poland, and more rarely in some adjoining countries, and peculiar to them, has attracted much attention during the two last centuries. It frequently appears in the course of some acute or febrile disease, or of some chronic internal complaint; but it also occurs, although more rarely, as the primary or principal malady. Hence it has been considered by some writers as an idiopathic disorder, but by others, and very recently by Dr. MARCINKOWSKI and BRIÈRE DE BOISMONT, who had frequently seen it in Poland, chiefly as a contingent critical affection.

36. i. DESCRIPTION. — After an attack of acute fever, characterised by languor, pains in the limbs and head, vertigo, an invincible disposition to sleep, rushing noises in the ears, pains in the orbits, injection of the conjunctiva, coryza, and sometimes clammy sweats, indications of plica are sometimes observed. Occasionally the febrile disorder is attended by redness of, or by an eruption on the skin, and an offensive perspiration. M. LEBRUN and the writers just named state, that it may occur in the course of any acute or chronic affection of the brain, or of the viscera of the chest or abdomen; and that, although it often is observed in the young and robust, it always is preceded and attended by more or less febrile or internal disease. Hence the remarkable differences in the descriptions of the constitutional symptoms attending it, as furnished by most authors; and hence the reason for viewing it as proceeding from a cachectic state of the constitution developed by these complaints, and by the peculiar habits and circumstances of those attacked by it. According to this, the opinion of Drs. MARCINKOWSKI and BRIÈRE DE BOISMONT, that it is generally *critical*, and should be treated by means directed to the primary disorder, will appear perfectly rational. M. JOURDAN and others contend that it is both primary or *idiopathic*, and *critical*; and that in the first form it appears suddenly or in a short time, attended by severe pains, resembling those of rheumatism or gout; in the second, it supervenes slowly, in the advanced course of various affections different in nature and character, but generally accompanied with viscous perspirations of the head. The scalp is most commonly or chiefly affected; but the hair in other situations and the nails are frequently also implicated.

37. The scalp is sore to the touch, excessively sensible and itchy; a clammy offensive sweat exudes from it, and agglutinates the hair, which loses its lustre and appears thickened, softened or distended by a glutinous fluid of a reddish or brownish colour. This fluid is produced at the extremities of the bulbs, and is transmitted to the ends of the hair. A peculiar offensive smell attends this exudation from the hair and scalp. The hair is matted or agglutinated in different ways — sometimes in single locks, of various thickness and length, resembling ropes — *male plica — plica multiformis*. Occasionally the hair is stuck together in one mass or cue. *Plica caudiformis*; and in other instances it is felted into a mass or cake, of various sizes — *Female plica*. The hair of the beard, pubis, and axillæ, may also present similar appearances. When thus diseased, the hair often acquires a great length. Instances of its reaching the length of some yards are adduced by the writers referred to at the end of this article. Professor Kaltschmidt possesses the pubes of a female, the hair of which may have readily reached round the body. The surface of the scalp is often covered with superficial ulcerations, or with incrustations formed by the morbid exudation; and numbers of *pediculi* are frequently seen in this and in other parts of the body. The nails of the hands and feet commonly become long, hooked, yellowish, livid or black.

38. Meckel injected the scalps of two persons who died with plica, but none of the injection reached the bulbs of the hair. J. Frank and La Fontaine found the hair-bulbs much enlarged, and full of a yellowish glutinous fluid; Gilibert also observed them distended by a dark fetid matter. Schlegel states that the hairs are enlarged, and filled with a yellowish brown fluid; and Rolfinch and Vicat say that they are so frequently distended with this fluid as to burst, and to discharge it externally. Similar changes have been observed by Gasc and others. M. Blandin remarked the bulbs to rise above the level of the skin, within the infundibuliform cavity of the root of the hair, as the papilla or bulb of the feather elongates and produces the quill in the young bird (Rayer). M. Sedillot found, on examining trichomatous hair with a microscope, the internal canals much larger than in healthy hair, and the cellular cavities near the canal much more distinct than usual. That the hair neither bleeds when divided, nor is sensible, has been shown by Boyer and others. The morbid sensibility attending the complaint is seated in the scalp and hair-bulbs.

39. ii. Causes. — Plica is said to have first appeared in Poland near the end of the thirteenth century. The earliest writers on the disease speak of it as well known. It is now wearing out. It has always been more frequent on the banks of the Vistula and Borysthenes, and in damp and marshy places, than in other parts of Poland. Very rare instances of it have been met with in Holland, Saxony, and some other places in Germany. Its endemic origin seems well established. La Fontaine states that, in the provinces of Cracow and Sandomir, plica affects the peasantry, beggars, and Jews, in the proportion of two thirds in ten; the upper classes in that of two in thirty or forty. In Warsaw and the vicinity, it attacks four out of forty or forty-five of the former class; and three out of ninety or a hundred of the latter. He assigns the same proportions to Lithuania as to Warsaw, and the same to Volhynia and the Ukraine as to Cracow. Schlegel, Gasc, Hartmann, and other recent writers, consider that the disease is not nearly so frequent as here stated. This malady appears in the human species primarily; and it is said also to affect the lower animals; but there has been no proof adduced of its transmission from the former to the latter. It has been supposed to be contagious, but this opinion has been shown to have been unfounded.

40. *a*. Amongst the *remote causes* of plica, wearing the hair long and applying to it oils and ointments, often rancid (Gilibert); neglect of personal cleanliness; keeping the head warm or covered with thick woollen or fur caps; using heating aromatic substances to the head, and covering it with warm applications and dresses with the view of procuring a critical discharge from it, especially in rheumatic or other diseases of this part, are the most influential. Schlegel imputes plica chiefly to the use of semi-putrid fish, and damp residences; and doubtless these often concur with the foregoing in predisposing to, or in exciting, the affection.

41. *b*. M. Jourdan considers this complaint, in respect of *its nature*, to consist of an increase of the vital functions of the bulbs of the hair and of their secretions, with augmented sensibility. Baldinger imputes it to rheumatic acrimony, attended by an increased secretion from the bulbs. Franck, Wolframm and Larrey view it as a consequence of, or as connected with, secondary syphilis; and many of the writers referred to, as a critical discharge, determined to the hairy scalp, by the concurrence of several of the causes just enumerated. By most of the authors, however, who have closely watched this affection, it has been considered as *sui generis*, and as seated essentially in the bulbs of the hair. Schlegel, La Fontaine, Robin, Chaumeton, Mouton, and numerous others have shown, that it is not a product of neglect or dirt, otherwise it would have been seen in other countries as well as in Poland; that the bulbs of the hair exude a peculiar viscid secretion which may be seen issuing from them when the morbid hair is removed; that they are found swollen and acutely sensible; that it is often attended by a similar change in the nails; that it is frequently a marked crisis of other maladies; and that it cannot be quickly removed without danger. Much of the difference of opinion as to the origin and nature of plica, and as to the consequence of removing it, has arisen from confounding the false (§ 12.) with the true disease.

42. iii. Diagnosis.— The precursory and characteristic symptoms are such as readily distinguish true plica, from the false or the felting of the hair caused by neglect of cleanliness, &c. and from every other affection. The agglutination of the hair by a nauseous exudation from its roots, the enlargements of the bulbs, the swelling and softening of the hair itself, and the attendant alteration of the nails, are peculiar to this complaint.

43. iv. Treatment.—The occurrence of plica in persons affected with various serious diseases has sometimes proved beneficial. In such cases

it should not be interfered with, until the agglutinated mass is pushed at some distance from the skin by the growth of healthy hair. When plica is left to itself, the febrile and other symptoms very frequently disappear of themselves. After several months, or a year, or even longer, the morbid exudation decreases or entirely ceases; and as an effect of the growth of hair, the diseased portion is removed to a distance from the surface. It is only then that the Polish physicians recommend the hair to be cut. Schlegel, La Fontaine, Hartmann, Mouton, and other experienced writers contend that the removal of the diseased hair before this time has been followed by amaurosis, palsy, convulsions, epilepsy, apoplexy, and even by death. Warned by these consequences, and considering the exudation from the scalp and pilous bulbs as a poison — "*virus trichomaticus*" — the expulsion of which from the system is essential to recovery, the Polish physicians frequently carry the principle of non-interference to an injurious length. At the same time, it must be admitted that a premature removal of the diseased hair and suppression of the morbid exudation is very likely to prove injurious upon the principles stated above, and insisted upon in various parts of this work; especially if such interference be not attended, and its consequences not prevented, by the exhibition of means which will eliminate effete or morbid matters from the circulation, by increasing the functions of other emunctories, particularly of the intestinal canal, kidneys, and skin. If, therefore, the hair become dry and sound at its roots, the best informed observers agree in removing it, the head being kept moderately warm afterwards; but, as long as the bulbs continue inflamed, morbidly sensible, and exude a viscid fluid, other means of cure should be prescribed. What these means, however, are, is a matter that has not yet been fully shown; and certainly the internal remedies recommended by most of the writers on plica are but little calculated to remove the morbid conditions on which it depends.

44. The marked disorder of the digestive and excretory organs, acknowledged to attend or precede the appearance of plica, although never viewed in sufficiently close connection with its causation, indicates the propriety of directing at least a part of the means of cure to these organs. The antecedent *pica*, and the morbid states of all the secretions and excretions, show the propriety of having recourse to purgatives — chologogue, deobstruent, stomachic, and others, according to circumstances — in the treatment. It is to the general neglect, in Poland especially, of these and of other evacuations, in the early stages of acute and chronic maladies, that the occurrence of this affection is, in my opinion, chiefly to be attributed. That purgatives are of service in plica is shown by the admission of the good effects resulting from them, by Hufeland, De la Fontaine, and Küster. From the manner in which the means of cure have been recommended in works on plica, it is very obvious that most of them are employed altogether empirically. The *Lycopodium clavatum* is much used both externally and internally, but some writers consider it inert. Various preparations of mercury, antimony, sulphur, zinc, &c., have been employed; and emetics, diaphoretics, anodynes, narcotics, have severally been insisted upon. It is obvious that these may be either serviceable or injurious according to the circumstances of the case, and the manner of prescribing them. De la Fontaine and Küster prefer sulphur and antimony, and their combinations, especially the golden sulphuret of antimony. J. Franck praises sulphur and conium. For the debilitated and aged, it is obvious that tonics, or a combination of tonics and aperients, are necessary. Personal cleanliness, warm baths, and suitable diet, are also requisite.

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HEADACH. — Syn. Κεφαλαλγια (from *κεφαλή*, the head, and *ἀλγέω*, I suffer pain); Κεφαλαία, *ἡμικρανια*, (from *ἡμι*, half, and *κρανιον*, the skull). *Cephalalgia*, *Cephalæa*, *Hæmicrania*, Auct. Lat. var. *Dolor Capitis*, Sennert, &c. *Dolor Cephalicus*, Hoffmann. *Cupiplenium*, Baglivi. *Gravedo Capitis*, *Carebaria*, Καρηβαρια (from *καρη*, the head, and *βαρυς*, heavy), *Podagra capitis*, *Clavus*, *Clavus Hystericus*. *Mal de Tête*, *Céphalalgie*, *Migraine*, Fr. *Kopfschmerz*, *Hauptwehe*, Germ. *Mal* *di Capo, Cefalea,* Ital. *Pain in the Head, Megrim.*

CLASSIF. — 4. *Class,* 4. *Order* (*Good*). IV. CLASS, III. ORDER (*Author*).

1. DEFIN. — *Pain in the head, with intolerance of sound, sometimes also of light, and incapability of mental exertion.*

2. Headach has too generally been referred to disorders of those viscera of the abdomen with which the head sympathises, even when manifestly proceeding from morbid states of parts enclosed by the cranial bones. It should, however, be recollected that the primary affections of which headach has been viewed as a symptom merely, much more frequently exist without, than with, this attendant; and that, when thus accompanied, some pre-existent or contemporaneous affection of the head is often actually present, either independently, or as an intimately related complication, of these reputed primary disorders, and is only aggravated or rendered more manifest by them. Besides — and the circumstance cannot be too strongly impressed upon the young practitioner — those very disorders so generally considered the source of headach are not infrequently produced by an affection of the brain; for, pain of the head, although a common symptom of it, is neither universally nor constantly present, but is very frequently altogether wanting at an early or an advanced period; so that disease of the brain itself may in the first place disorder the digestive or other functions, this disorder reacting upon the brain, or on the nerves more immediately related to it, and exciting or otherwise altering their sensibility, so as to give rise to headach and other symptoms actually depending upon the brain, although developed and rendered manifest by the sympathetic disturbance of the digestive organs. When this takes place, the means of cure directed to the supposed primary disorder, but really to the symptomatic affection, by removing it, and by modifying the current of the circulation, frequently relieves the disease of the brain as far as morbid sensibility is concerned; and the relief is more or less complete or permanent, according as the prescribed means affect both the symptomatic and the primary disorder. That secondary or sympathetic affections are often thus mistaken for the primary will be manifest to every experienced and acute practitioner upon reading Dr. WARREN's paper on headachs; for many of the symptoms he has enumerated, as indicative of primary disorder of the stomach and intestines, are often either dependant upon the state of the circulation within the head, or associated with an affection of this part, and are resulting phenomena of previous disorder of the organic nervous system.

3. The dependence of disorder of the digestive organs and of the altered sensibility of the head upon the state of organic nervous influence has been overlooked by pathologists, owing to the brain having been generally, but erroneously, viewed as the source of nervous and vital energy, and to the dominion which the stomach has been supposed to exercise over the functions of other organs, through the medium of the brain. But it has been shown in another place (see art. DEBILITY, DISEASE, &c.), that the brain performs other offices than that of generating organic, nervous, or vital power; that it is enabled to perform its appropriate offices by the vital influence it derives from the organic nervous system; and that the stomach is dependent upon the same source as the brain for the discharge of its functions. Instead, therefore, of considering headach to proceed so frequently from disorder of the digestive organs as some recent writers suppose, I view both the one affection and the other as often associated phenomena resulting from other morbid conditions; and whilst I grant that it sometimes arises from that source, I contend that it then appears as a contingent phenomenon only, for when one part of the circle of organic nervous influence is disturbed, other parts frequently become also disordered, as hereditary constitution, previous disease, latent vice, or habits of life, may have predisposed particular organs or structures. Moreover, it seems extremely probable, that various morbid states of parts contained within the cranium are indicated by pain, before they have proceeded so far as to induce change of structure, or even without occasioning this result. The existence of altered sensibility of the ganglial nerves distributed to the head may be admitted, without any very evident alteration of the parts they supply being thereby induced. Observation has proved that the degree of pain is no index to the danger or extent of disease, as the most severe headachs are often unattended by any other evidence of organic lesion; whilst the most extensive disorganisation is frequently accompanied by little or no headach.

4. From this it will appear, that headach should be viewed as a symptom of disorder within the cranium, although not of altered structure, more frequently than it usually is; that it should be oftener assigned to a change in the organic nervous energy and sensibility in this situation; and, consequently, that it is oftener a primary disorder, than it has been generally considered. In treating, therefore, of headachs, I shall view them with strict reference to pathological states. Some of these states are such as do not admit of the headachs they produce being viewed otherwise than as symptoms; but others allow a nearer approach to a primary or idiopathic form, especially where local or general causes of exhaustion or depression occasion the complaint.

5. When called to a person suffering, or liable to, severe headach, the rational practitioner is led to inquire as to the *causes* and *seat* of pain, and as to its *nature*. But these are amongst the most difficult points to determine in practical medicine. The *causes* are most numerous and diversified; and yet they have a more or less intimate relation to the kind or form of the pain that results. The *seat* of pain is determined with great difficulty even when it admits of recognition, and, in many cases, it is impossible to ascertain it with any degree of precision. In order to arrive at a just conclusion, a number of circumstances — the history of the case with its causes and progress, the existing symptoms, and more especially those which more directly relate to the functions of digestion and excretion, and to perception, sensation, and locomotion, must be carefully observed and cautiously estimated. When the external or superficial parts of the head are chiefly affected, the exact *seat* and *nature* of the disorder are sometimes manifest.

But even in this case, the external affection may be only the consequence of previous disease of internal parts, the exact nature or seat of which can be only surmised in many instances. Disease of the membranes is generally attended by pain; but when it is chronic, and even when acute, if pressure of the brain is caused by it, no headach may be felt. When the more internal parts, especially the fibrous or medullary structure, are altered, pain is only an occasional symptom. Indeed, whenever the substance of the brain is chiefly affected, the pain should be ascribed rather to those parts of the membranes, or of the ganglial nerves supplying the brain, that had become implicated in the disease, than to the brain itself. Although it is the brain that feels alteration of sensibility induced in morbid parts, yet its own sensibility is so obscure, or so deficient, as seldom to be either excited or perverted when itself is the seat of lesion. Besides this, when the disease of the brain is attended by pain, the pain is rarely referred to the internal parts of the head, but either to some superficial situation, or to the head generally, in a confused or indistinct manner; or to some more or less distant part having an intimate nervous connection with the seat of disease.

6. The difficulty of ascertaining the *nature* of headach cannot be considered so great as that of determining the seat of it. Indeed it is often from inferences as to the nature of headach, that we are enabled to form any notion of its seat. A careful inquiry into the causes of the pain in every case, and a due estimate of the constitution, habits of life, previous ailments, and existing state of the patient, will generally enable the physician to determine as to which of the different forms of the complaint, into which I have divided it, individual cases belong. The *kind* of pain especially should be inquired into with the utmost precision. Its severity, its character, the state of the senses, and of the general sensibility, the temperature of the scalp, &c. ought to be ascertained. The *pain* may be either slight or intense, or characterised as heavy, dull, indistinct, diffused, numbing, compressive, constrictive, tensive, acute, burning, rending or bursting, or splitting, darting, lancinating, plunging, cutting, tearing, gnawing, boring, pulsating, or throbbing, &c.; but whichever of these may exist, the mode of its accession and subsidence; its duration, remissions, and exacerbations; the circumstances alleviating or aggravating it, the extent and situation of it, and its connection with affections of sight — with noises in the ears — the character of these noises — and with derangements of sensation, touch, and muscular action, in any part of the body — ought to be carefully remarked. The state of the mental operations, of the articulation, and of sleep in respect both to its manner and duration, should also receive attention. It is only from a careful estimate of these circumstances — of all the functions depending upon the cerebro-spinal system in connection with the state of the digestive, excreting, and circulating functions — that a correct opinion as to the nature of headach can be formed. There is no disorder which tries the science, experience, powers of observation, and acumen of the physician, more than this does, and there is none that requires a more precise estimate of the pathological conditions on which it depends, as a basis for safe and successful indications of cure. From this it will appear, that a comprehensive division of the varieties of headach, without being either complicated or unnecessarily minute, is requisite to the due consideration of so important a subject as this.

7. SAUVAGES *divides* headach into three *species:* — *Cephalalgia*, or acute headach; *Cephalæa*, or chronic headach; and *Hemicrania*, or partial or local headach. Under the *first* he enumerates the following *varieties:* the *plethoric, catamenial, hæmorrhoidal, dyspeptic, febrile, throbbing, intermittent, puerperal, inflammatory, catarrhal, nervous, hysterical*, and the *metallic*. Under the *second species*, he adduces the *syphilitic, scorbutic, arthritic, remittent, melancholic*, the *Polish*, or *plicose*, and the *serous*. Under the *third*, pains of the *eyes* and *sockets*, in the *frontal sinuses*, and the *catarrhal* and *hysterical, hæmorrhoidal, purulent, nephralgic*, and the *lunatic hæmicrania*. It is obvious that this enumeration is deserving of attention, only in as far as it shows the symptomatic states of the disease. SAGAR adopts the division of SAUVAGES without any material alteration. J. FRANK also follows it partially, and enumerates *four species*, viz. *Cephalalgia, Cephalæa, Hemicrania*, and *Clavus*. He considers that headachs, in respect of their *nature*, may be further divided into *inflammatory, rheumatic, gastric, arthritic, scorbutic, periodic, scrofulous, carcinomatous, syphilitic*, and *nervous*.

8. Dr. GOOD has taken a very superficial view of the pathology of headach, and the surgical Editor of his work has added nothing to the text. He divides headachs into the *stupid, chronic, throbbing*, and the *sick*, and *megrim*. Every practitioner of experience must have met with, if he have not actually experienced in his own person, headachs which at one and the same time possessed all the characters Dr. GOOD has enumerated as marking distinct species. Dr. BURDER has given a more correct division of the complaint, but it is deficient in some important particulars. The *varieties* according to him are — *muscular, periosteal, congestive, organic, dyspeptic*, and *periodic headach*. Dr. WEATHERHEAD divides headachs into *dyspeptic, nervous, plethoric, rheumatic, arthritic*, and *organic*. The division adopted by SAUVAGES is complicated, and, notwithstanding its apparent minuteness, deficient. The arrangements of recent writers are even still more defective.

9. The several varieties of headach will be more advantageously considered according to the following arrangement: — 1st, The *nervous* — from depression or exhaustion; — 2d, The *congestive*, from impeded circulation in the brain or its membranes; — 3d, The *plethoric* and *inflammatory*, from general plethora, active determination of blood to the head, or inflammatory action; — 4th, The *dyspeptic* and *bilious*, from disorder of the stomach, liver, or bowels; — 5th, The *cerebral*, from organic change within the cranium; — 6th, The *pericranial*, from disease of the pericranium, or bones of the cranium; — 7th, The *hæmicranical* or *limited*, confined to a spot, or neuralgic; — 8th, The *rheumatic* and *arthritic*; — 9th, The *periodic*; — 10th, The *hypochondrical*; — and, 11th, The

sympathetic, from disorder of the uterine and urinary organs.

10. i. Nervous Headach. — *A. Causes.* — *a.* This *variety* is mostly frequent in females, in persons of the nervous temperament, and in those possessing high susceptibility, and delicate constitutions. Venereal excesses, masturbation, intestinal worms, the abuse of calomel or other mercurials, and whatever depresses or exhausts nervous or vital energy, *predispose* to it. — *b.* It is often *excited* by exposure to cold, or to cold and humidity conjoined; by northerly or easterly winds; by the more extreme electrical states of the air, or by sudden vicissitudes of these states; by prolonged or excessive lactation; by losses of blood, menorrhagia, leucorrhæa, or other discharges; by low diet and prolonged fasting; by the depressing passions, alarm, fear, grief, and anxiety of mind; by want of sleep, or inordinate mental or physical exertion; by the improper use of mercury or other depressants, as tobacco, digitalis, &c.; by various odours or mephitic vapours or gases; and by the impure air of crowded or insufficiently ventilated rooms. Sleeping in apartments containing plants in flower, the fumes of burning charcoal, or of turpentine, and recently painted rooms not infrequently cause it. The irritation of adjoining parts, as caries of the teeth and disease of their fangs sometimes also occasion it, especially on the same side of the head as the seat of irritation. I have seen the most intense state of this affection produced by the injudicious application of cold to the head, by too copious depletion, by floodings, and by a residence in low, cold, and humid localities. Nervous headach is common to females during the catamenia, especially when excessive or too frequent. It is often, also, indirectly caused by intoxicating liquors. Heinimann very justly notices it, as a not infrequent attendant upon *general anæmia*, resulting from disease or improper treatment. I believe that some degree of *celebral anæmia* very often attends, if it does not produce, this variety of headach.

11. *B.* Nervous headach is often sudden in its attack and termination; is frequently acute, excruciating, lancinating or darting; sometimes constrictive, or attended by a sensation of the temples being pressed together; occasionally accompanied with vertigo, a feeling of sinking and dread of falling, or with great nervous agitation or restlessness, and sometimes confined or limited to a narrow space. The patient is incapable of thought and of physical and mental exertion. The sight is often dim or impaired; dark spots or meshes moving before the eyes. In some instances the eyes become sunk, and the countenance depressed or collapsed. The pulse is small, occasionally frequent, but generally languid, and always compressible. The pulsation of the carotids is small or weak. The head is cool, and the face more pallid than natural. The stomach is liable to disorder, especially to acidity and flatulence, and the bowels are often costive. This headach is frequently worse in the morning and through the day, and abates in the evening. During severe attacks, wakefulness, dizziness, loss of memory, general susceptibility of the nervous system, &c. are usually complained of.

12. ii. Congestive Headach.—The state of the circulation within the head; the manner in which the blood is returned from the brain; the partial protection of the parts contained in the cranium from the physical influences exerted upon the rest of the general surface; and the periodical changes in the position of the head, and in the exercise of the functions of the brain, would seem, on a superficial view, to favour the occurrence of congestion in this part. Yet, if these circumstances be more closely contemplated, there is at least equal evidence, that they essentially tend to preserve the brain from passive congestion on the one hand, and inflammatory determination on the other, as well as from the more serious contingencies consequent upon that minute division of the extreme vessels required for the exercise of the various cerebral functions. The congestion occasioning this form of headach is seldom general, but commonly limited to, or seated chiefly in, one hemisphere or lobe of the brain, or one or more lobes, either in their vertical or basilar aspect.

13. *A. Causes.*—Congestive headach is produced by pre-existent disorder, especially by repeated attacks of nervous or dyspeptic headach, and of active determination of blood to the brain. It often follows adynamic fevers, phrenitis, congestions of the lungs, and impeded circulation through the heart; and it is not infrequently caused by the circumstances that sometimes give rise to nervous headach, particularly the depressing passions, cold and humidity, miasmata, noxious gases, mephitic vapours, and crowded rooms. The use of opium, belladonna, aconitum, and other narcotics, occasionally also produces it, especially in certain idiosyncrasies, or in large doses. Tight neckcloths, stooping, and a too low position of the head during sleep, also occasion it. The headachs following the inordinate use of intoxicating liquors are to be referred to this and the preceding variety, rather than to disorder of the digestive organs or any other pathological state. Prolonged or intense mental occupation often gives rise to congestive headach; the repeated or continued determination of blood to the brain, thereby produced, passing into congestion, owing to exhaustion of nervous power; and this state, if allowed to continue, or frequently produced, often terminates in apoplexy or palsy. This variety is most frequently observed in persons advanced in life, and in those who have exhausted their vital energies and injured their constitutions by dissipation or intemperance.

14. *B.* The most *characteristic symptoms* of this variety are — the dull, gravative pain, and sense of weight in the head; frequently stupor, heaviness, or giddiness; dimness of sight; buzzing, ringing, or humming noises in the ears; and heaviness or pallor of the countenance. The pain is often referred to one part of the head chiefly, probably owing to the congestion being greater in one part than in another (§ 12.). The patient experiences great increase of vertigo when looking up, or when stooping or looking down from an eminence; he sometimes complains of a sense of coldness in the head, of fatigue or prostration of strength, coldness of the extremities, and of susceptibility of the nervous system. Sleep is often sound, heavy or snoring; occasionally it is disturbed or restless, and attended by dreams, or by convulsive movements. The spirits are depressed, or almost hypochondriacal. The pulse is languid, weak, or small, occasionally accele-

rated. The bowels are torpid, and the biliary secretion deficient or morbid. The urine is loaded, and deposits a copious sediment.

15. iii. HEADACH FROM PLETHORA AND INCREASED VASCULAR DETERMINATION OR ACTION.— *A. The predisposing causes* of this variety are — the earlier and middle periods of life, the male sex, plethoric habits of body, sanguineous and irritable temperaments, full living, indolence, indulgence in bed, neglect of regular exercise in the open air, and mental exertion.—*B. The exciting causes* are — all the circumstances which either increase the vascular plethora resulting from the predisposing causes, or determine an increased flow of blood towards the head, especially, neglect of accustomed depletions; the suppression of discharges and eruptions, particularly of epistaxis, the catamenia, and hæmorrhoids; exposure to the sun; intemperance in eating or drinking; premature or inordinate mental culture, and exercise of the intellectual powers; every kind of mental excitement, fits of passion; the supine posture with the head low; wearing strait corsets; too long hair, or the removal of it; overheated or overcrowded rooms or assemblies; prolonged or unaccustomed continence, and the causes usually occasioning inflammation of the brain or of its membranes, or determination of blood to these parts. (See art. BRAIN, § 182.)

16. *C.* The *Symptoms* in this variety sufficiently indicate the cause of the headach; but they differ very much in different habits, temperaments, and ages.—*a.* In young persons, the pulse is strong, or full, somewhat accelerated; the head is hot, the countenance flushed, the eyes more or less suffused and heavy; and the pain is rending, severe, sometimes pulsative or throbbing, occasionally with a beating noise in the ears, and felt chiefly in the forehead and temples. The bowels are costive; and the patient is depressed, heavy and indisposed to exertion. *b.* In delicate or young persons, whose mental faculties have been prematurely exercised, or exerted to the neglect of the physical powers, the slightest excitement and the most trifling causes will produce headach, with coldness of the extremities, and great susceptibitity of the nervous system, especially of females. The principal flux of the circulation takes place to the head, and the functions of other parts are performed imperfectly. — *c.* In persons of the middle age, or beyond it, and especially in those who have lived fully or intemperately, the headach is heavy, rending, or throbbing; often general, or referred chiefly to the occiput; attended with increased heat of the scalp, with distension of the veins about the temples, with fulness or redness of the eyes, and sometimes also of the whole countenance. The face is occasionally bloated, and its expression heavy; the pulse is full, strong, and oppressed, or slower than the usual standard; the bowels are torpid, the liver inactive, and the urine high-coloured or loaded. Sleep is heavy, but often disturbed. In some cases, however, with all, or nearly all, these symptoms, the patient is excited, or restless, is watchful, or sleeps but little, or is irritable, and the pulse is slightly accelerated; the excretions being scanty. In the first and second classes of persons, this form of headach not infrequently precedes inflammation of the brain and membranes, or effusion from the latter: in the third class, it more frequently ushers in apoplexy or palsy.

17. iv. DYSPEPTIC AND BILIOUS HEADACHS.— *A.* This variety of headach is very nearly allied to the nervous and congestive, and it has been confounded with these in the description of it given by Dr. WARREN. From the circumstance of sickness or vomiting being a frequent symptom, the term *sick headach* has been commonly applied to it. But I am convinced that this symptom often depends upon the brain, and that many cases, which have been viewed as merely instances of sick headach, have actually been cases in which the affection of the brain had been attended both by sickness and by headach (§ 2. *et seq.*). This form of disorder frequently affects dyspeptic persons who have been longer than usual without food, or who have committed even slight errors of diet, and whose bowels are habitually sluggish. It may occur, as Dr. BURDER remarks, without any obvious susceptibility of the brain; or in persons who can bear close application to study without inconvenience as respects the head, and yet who are liable to headach after taking certain articles of food, or mingling them in too great variety.

18. Dyspeptic headach, particularly when attended by nausea or vomiting, is observed chiefly in persons subject to mental or cerebral excitement, and in whom the gastric disorder, as well as the pain of the head, are only effects of that excitement. In these, the stomach is either irritable, or weak, or even both, and unfit to perform its functions, as well as very liable to become further disordered by slight causes. Stomach headach generally affects the forehead on one temple, particularly the left; but it often extends over most of the head. When the left temple is chiefly affected, tenderness of the left eye is frequently also felt. The pain is dull, heavy, or oppressive, or acute, sharp, or darting. The mental faculties are somewhat weakened, and exertion of the mind is irksome. Tenderness of the scalp is seldom present, unless in a slight degree, or in connection with rheumatism. This variety of headach usually commences when the patient first wakes. It is then oppressive, heavy, or diffused. Nausea often supervenes, and sometimes vomiting. When the pain is slight, it generally subsides after breakfast; but if retching occurs, it continues longer, or until offending matters are thrown off, and then becomes more limited or concentrated. The remains of an undigested meal, or merely an insipid fluid, mixed with frothy mucus, is at first ejected. But if the vomiting continue, bile is frequently discharged. In some instances, an acid or acrid fluid, or greenish bile, is vomited, when pain and all the symptoms disappear. If the attack be not arrested by suitable means, or by the spontaneous vomiting, the pain often increases as the day advances, until stimulating food or beverages taken into the stomach, or sleep, allays it; but it may return the following day. Dyspeptic headach, however, may take place much more slightly and transiently; or it may assume a more chronic or continued form. It may follow a principal meal, and cease in two or three hours; or it may not occur until several hours after a meal. The pulse is languid or feeble, seldom accelerated. The tongue is white, loaded, particularly towards the root;

and its edges are slightly red, and often indented by the teeth. The bowels are usually costive. Vision is frequently indistinct; and coldness or slight numbness of the fingers is sometimes complained of.

19. *b.* It has been supposed by Dr. WARREN and Dr. PARIS, that, when the headach does not occur until several hours after a meal, and particularly when uneasiness or a sense of distension is felt in the situation of the duodenum, it depends upon irritation of this viscus. The circumstance of an emetic often failing to afford relief in such cases, or to evacuate any thing material from the stomach, whilst a dose of rhubarb and magnesia, or of any other purgative, generally removes both the headach and the uneasiness in the course of the duodenum, has been considered as proof of the dependence of the affection of the head upon disorder of this bowel. Without questioning the existence of functional disorder of the duodenum in these cases, the origin of the headach in that disorder does not necessarily follow. Both affections, most probably, depend upon the same pathological states; and it is, moreover, extremely likely that the derangement of the duodenum extends more or less to both the stomach and liver. The symptoms which the writers just referred to consider characteristic of headach proceeding from disorder of the upper portion of the intestines, — particularly chilliness of the body, coldness and dampness of the hands and feet; severe pain of the head, with a sense of coldness and tightness of the scalp; slight giddiness, with weight, distension, and stiffness of the eyeballs, and the appearance of brilliant ocular spectra; and sometimes tingling and numbness of the fingers and hands,— arise as much from disorder of the stomach or liver, or both, as from derangement of the duodenum and upper parts of the intestines. More dependence may, perhaps, be placed upon flatulency and the sensation of dryness and inactivity of the bowels noticed by Dr. PARIS, and upon the presence of nausea without vomiting; but it is most probable that the altered sensibility referred to the head, equally with the symptoms just mentioned, depends primarily upon the state of organic nervous influence.

20. *B.* Biliary derangement is generally connected with more or less disorder of the stomach and bowels: the affection of the one may have extended to the other; or all may have been simultaneously disturbed by causes affecting the nervous or the vascular systems. In either case, the disturbance is not infrequently also extended to the head, and partly manifested by pain in this situation, particularly in the forehead, eyebrows, and orbits. — *a.* The headach may proceed from an interrupted discharge of bile into the duodenum, and a consequent accumulation of it in the gall-bladder or hepatic ducts; the morbid impression thereby made upon the organic nervous system affecting the head, and often, also, other remote parts. When the headach arises from this state of disorder, vascular action is generally weak, languid, or depressed, the tongue loaded or white, the skin harsh or unhealthy in its hue, and the functions of digestion and fæcation impaired. In these cases, flatulence, coldness of the extremities, and a sense of smarting in the eyes and eyelids, or pain in the eyeballs, are often, also, complained of.

21. *b.* In some instances, headach proceeds from an exuberant secretion of bile, or from the irruption of morbid bile into the duodenum; but, in most of these, there are increased vascular action and heat of skin, with nausea and bilious vomitings. The face is flushed, the eyes suffused, and the pain is throbbing or rending. The evacuation of bile often gives relief; but the retchings sometimes keep up the secretion, or promote the discharge of it; and the digestive mucous surface, and the nerves supplying it, being thereby irritated, vascular action becomes excited, and the sensibility even of remote parts more or less altered: pains of the head, loins, and limbs are thus induced.

22. *C.* The *Causes* of dyspeptic and bilious headach have a very intimate relation to the predisposition or susceptibility of the nervous systems and digestive organs to excitation or irritation. — *a.* Such susceptibility very often exists in a high degree in persons of sedentary and studious habits. Intense application of the mind, the anxieties of parents, the eager pursuit of business or of gain, the speculations of merchants, the gambling transactions of the stock markets and of club-rooms, &c., keep the mind in an almost constant state of excitement, determine an augmented flow of blood to the brain, and thereby increase the irritability of the stomach, and predispose both organs to be disordered by the slighter causes to which the latter is so much exposed. As vital power becomes weakened, the susceptibility of the cerebro-spinal nervous system is increased, and the sensibility of it more readily disturbed. The digestive and assimilative functions are also weakened, and more prone to disorder, which not infrequently affects the brain, especially when its circulation has been excited, or kept in an almost constant state of erethism, by the circumstances just adverted to. Dyspeptic headach is most common in the young or middle aged. The bilious variety is most prevalent during summer and autumn.

23. *b.* The *exciting causes* are — errors in diet, especially too great a variety or quantity of food; indigestible, acrid, cloying, rich, or heavy articles; too long fasting; the excessive use of diluents or of stimulating or intoxicating beverages, particularly of spirituous liquors; costiveness or constipation, and the irritation of morbid secretions and fæcal matters retained in the bowels. In young persons, especially, headach and increased determination of blood to the head are frequent consequences of costiveness, of collections of sordes or of fæcal matters in the digestive canal, and of intestinal worms.

24. v. HEADACH FROM ORGANIC CHANGES. — In the early stages, this form of headach can hardly be distinguished from the other varieties; indeed, organic change not infrequently originates in some one of the pathological states of which headach is an occasional attendant. But, whilst in all these varieties the pain is only sometimes present, or is, at least, entirely absent for considerable periods, that produced by organic lesion is nearly constant or continued, or merely remits, without altogether disappearing. The alterations which are attended by headach are numerous; indeed, all those enumerated in the articles BRAIN (§ 3—133.), and CRANIUM, may give rise to it; but the most common are tumours of various kinds, hydatids,

exostosis from the inner surface of the cranium, ossific formations, softening of the substance of the brain, suppuration, adhesions of the membranes; tubercular, cancerous, fungous, and malignant productions, &c. Besides these, aneurismal or ossified arteries, varicose or inflamed veins, obstructions in the sinuses and veins; concretions, albuminous exudations, or purulent matters in these vessels (LIEUTAUD, BORSIERI); enlargement of the pineal or pituitary glands, serous effusion, &c., have been observed.

25. The pain caused by any of these lesions is generally fixed, often referred to the same spot, continued, and deep seated. It is independent of the other causes of headach, although aggravated by them, by mental application, by stooping, and by stimulants. Dr. BURDER justly remarks, that cheerful conversation, that would chase away, or at least suspend, the feeling of ordinary headach, often becomes insupportable in this variety. When the disease is farther advanced, even a slight motion of the head, or rotating it, often gives rise to extreme suffering, and sometimes to vomiting. The affection of the stomach dependent upon the cephalic lesion frequently occurs without any obvious cause, or independently of apparent disorder of the stomach itself, or of any error in diet; and the pain of the head remains when the sickness ceases. Although the pain is generally constant, yet remissions are sometimes felt, or even short intermissions, especially early in the disease. This is even the case when the lesion is malignant or carcinomatous, or consists of fungous tumours; and the pain is usually then lancinating, stounding, or darting, and referred to a particular spot. In the advanced stage of organic headach, spasmodic contractions of the limbs, vertigo, convulsions, paralysis, or idiotism, frequently supervene. When the lesion is of a malignant or contaminating nature, the surface generally assumes a pale straw-coloured hue, or is obviously cachectic. Neuralgic pains in the face, or in more remote parts, darting pains in the limbs, are also occasionally present in this variety. (See arts. BRAIN — *Softening of*, *&c.*, and PALSY.)

26. vi. HEADACH FROM DISEASE OF THE PERIOSTEUM AND CRANIAL BONES. — This variety is not often met with. Cases of it have been recorded by Mr. CRAMPTON, Sir E. HOME, Dr. ABERCROMBIE, and others; but the best description of it is given by Dr. BURDER. — *a.* Affection of the *periosteum* is usually *caused* by exposure to cold, to currents of air, to humidity, and vicissitudes of temperature and weather. The pain is tensive, remitting, and increased by pressure, and by the action of the temporal or occipito-frontalis muscles. There are sometimes fever and excited action of the vessels of the head, with increase of the heat of the scalp. A constrictive pain is caused or aggravated by going into a cold room, or by removing the usual covering from the head. Dr. BURDER observes, that this variety of headach occurs only in those who have suffered from continued cerebral excitement; and that it is commonly dependent upon a highly susceptible, or preternaturally vascular, condition of the brain or its membranes, such as is often induced by long-continued study, by mental irritation, or by gastric or hepatic disorder, connected with debility or exhaustion. If a person, whose nervous or vital powers are thus impaired, and whose brain and membranes are rendered susceptible and vascular, is exposed to the exciting causes just mentioned, periosteal cephalalgia of great severity or obstinacy is often produced; the external affection, with the consequent irritation and want of sleep, aggravating the morbid condition of the brain and membranes. The cases which I have seen have been chiefly in persons of the scrofulous diathesis.

27. Cases of fixed pain of the head, and tenderness of a portion of the scalp, with thickening or swelling of the integuments, have been observed by the writers just mentioned, and by Mr. PEARSON and Sir C. B. BRODIE. I have seen instances of this affection originate in *otitis*: one of these was in a medical friend, who consulted also Dr. J. JOHNSON and Sir C. B. BRODIE. The external disorder followed the use of the cold douche or shower bath, recommended for the removal of increased vascular action and heat of the scalp indicative of cerebral excitement. — Division of the pericranium in these cases has generally shown thickening of the periosteum; and even disease of the bone in a few instances.

28. When headach is owing to a diseased state of the bones, (see art. CRANIUM), there are constant pain and tenderness of a particular spot. Some of these cases originate in syphilitic or mercurial cachexia. Others proceed from inflammation of the ear, and are connected with chronic discharges from this organ, or consist of caries of a portion of the petrous bone, or of the mastoid process. In the cases of this kind which I have seen, there was partial paralysis of the face, with excessive swelling around the ear, especially below it, and extending even to the eye. I attended one of these cases with Mr. BARNWELL; and another was seen by Sir C. BELL and myself, and is noticed in his work on the nervous system. Similar instances are recorded also by J. FRANK and others.

29. vii. RHEUMATIC AND ARTHRITIC HEADACH. — *A. Rheumatic Headach* is usually *caused* by exposure to cold, or to cold and humidity, or to currents of air; by uncovering the head when perspiring; by sleeping on a damp pillow; by the passage of air through a carriage window; by sudden vicissitudes of temperature or of weather, especially by easterly or northerly winds. But a *predisposition* arising out of the rheumatic diathesis, or of disorder of the digestive organs — particularly torpor of the liver, accumulations of bile in the bile passages, and collections of sordes in the intestinal canal — is often necessary to the production of this affection of the head.

30. Rheumatic headach is often preceded by a sense of coldness over the head and face, especially on one side. It is seated chiefly in the aponeurosis of the occipito-frontalis and temporal muscles; but it is not always confined to this structure, it being sometimes associated with increased vascular determination to the membranes of the brain. The pain is severe, heavy, distracting, or aching, and in its uncomplicated state is attended by a sense of coldness, by great tenderness of the scalp, by rheumatic pains extending down the neck, or in one side of the neck, or in one shoulder, or in the face; sometimes by copious perspirations; and more rarely by rheu-

matic inflammation of one or both eyes. It is generally aggravated in the evening, and alleviated in the morning, and by warmth. There is no increase of the temperature of the scalp, or augmented action of the arteries of the head, unless the affection be complicated with excited vascular action in the internal membranes. If it be thus complicated, these symptoms are also present; and, as Dr. ELLIOTSON justly observes, there are likewise giddiness, drowsiness, and internal throbbings. This associated disorder is seldom ameliorated by warmth; and the face is often flushed, the eyes injected, and the vessels loaded.

31. *B. Arthritic Headach* is met with in persons who are subject to the irregular forms of gout; and, in those who have an hereditary or an acquired predisposition to this malady, it may be the first manifestation of the gouty affection. Of this I have seen more than one instance, both in males, and in females about the change of life. It is not an unusual form of misplaced or of retrocedent gout, in persons who have had the disease in its more regular forms, but who neglect the air, exercise, and regimen necessary to the developement of a regular paroxysm; and it is often a dangerous affection. The pain is severe, and attended by a sense of fulness and of heat or burning in the head; by remarkable tenderness, and by increased heat of the scalp; by giddiness, dimness of sight, and fear of approaching insensibility, especially upon stooping; by sounds in the ears, great acuteness of hearing, and intolerance of noises; by flushes of heat in the face; by irritability of temper and restlessness; and by confusion of thought and loss of memory. There are also flatulence and disordered digestion; costiveness; a morbid state of the stools, and of the biliary secretion; and scanty high-coloured urine, which deposits a copious reddish sediment. The tongue is generally loaded, and its papillæ excited; and the pulse is either natural, as to frequency, and full, or accelerated and hard, or oppressed. If this affection is not removed, it may pass into effusion, with comatose or apoplectic symptoms. (See GOUT — *Irregular Forms of*, § 16.)

32. viii. INTERMITTENT HEADACH — *Cephalalgia Periodica*, Auctorum — *Febris Intermittens cephalica larvata*, J. FRANK — usually presents the same characters as the functional varieties already described, especially the nervous and dyspeptic, and differs from them only in respect of periodicity. But it may be not merely functional; for the pain caused by chronic inflammation of the membranes, or even by organic lesion within the cranium, may assume, at their early stages, an intermittent type. A strict investigation of the causes, and of the states of the various functions, is therefore requisite to a knowledge of the nature of the affection. When the headach proceeds from terrestrial exhalations, or from cold, raw, easterly or northerly winds, and attacks persons who have been affected with agues or remittent fevers, it generally returns daily, either in the morning or about noon; but it may observe a tertian or quartan form. It is often limited to a particular part of the head, — frequently to the forehead, or to one brow, or to the brow and orbit — brow-ague. It is sometimes seated in one half of the head. The pain is occasionally so severe and so limited in extent, as closely to resemble neuralgia. Indeed, intermittent headach and neuralgic affections almost insensibly pass into each other; the paroxysms of the latter being, however, much more intense and of shorter duration than those of the latter; and they both frequently proceed from the same predisposing and exciting causes, namely, disorder of the stomach, bowels, and biliary organs, and exposure to malaria, or to cold damp winds, &c.

33. ix. HYSTERICAL AND SYMPATHETIC HEADACH. — The pain in the head is one of the numerous forms in which hysteria manifests itself. It is generally limited to a small space, or to a single spot; and is often described as resembling a wedge or nail driven into the cranium or pressing upon the brain — *Clavus*, &c. It is commonly sympathetic of irritation of the uterine organs, and associated with irregularity of the uterine discharge — with painful, scanty, or excessive menstruation, or with leucorrhœa; and with flatulent borborygmi, or with the globus hystericus. I have seen it also connected with *worms* in the intestines, with the irritation of calculi in the kidneys, and with tenderness, and other indications of inflammatory irritation, of parts of the spinal chord and membranes. — Indeed, affections of the spine seldom exist without pain in the head, in some one of its forms, being occasionally felt.

34. x. HYPOCHONDRIACAL HEADACH. — Pain of the head is often one of the most distressing symptoms of which hypochondriacal and melancholic persons complain, and is exaggerated by them into the most intense suffering that can be imagined; and yet, when heir attention is directed to other objects of interest, or when they are otherwise excited, this part of their miseries seems altogether forgotten, or for the time removed. Their minds brood upon the cause and consequences of the pains referred to this situation, until they firmly believe the very worst results. A patient, some time since, called upon me to know whether or not I considered the pain to depend upon organic change; and, although my opinion was that this was not the source of the affection, yet several visits were afterwards made to me with the same object. Another more recently came under my care, with the firm belief that the headach would terminate in insanity or idiotism. Such cases are, however, not rare; and although the fears, which subsequently become the firm convictions, of the patient, are fulfilled in some instances, or even impel them to suicide in others, yet recovery is not infrequently effected by judicious treatment and management. The source and character of the pain in such cases are ascertained with difficulty, as the patients' accounts are often exaggerated; but are most frequently dependant, as far as I have observed, upon the state of the nervous system, in connection with chronic disorder of the digestive canal and biliary organs. The organic nervous energy is manifestly impaired, and all the functions which chiefly depend upon it. But I have seen cases furnishing evidence of congestion, or of chronic inflammatory action, of the brain or of its membranes, and have found a treatment based on this view more or less beneficial.

35. xi. OF HEMICRANIA, AND PARTIAL AND NEURALGIC HEADACHS. — These can scarcely be considered as distinct varieties of headach, inasmuch as the pains proceeding from the patholo-

gical states which have been passed in review are very frequently limited in extent, or confined to one side of the head, or affect it chiefly. This is especially the case with the dyspeptic, the bilious, the organic, the nervous, the rheumatic, the intermittent, and the hysterical varieties; and it is still more so in respect of that, upon which a few observations remain to be made — the *neuralgic.* — *A.* This variety is characterised principally by the intensity of the pain, which is confined to a single spot, or extends in the course of a single nerve. The pain comes on in violent paroxysms, is of short duration, and is followed by distinct, and often by considerable, intermissions. There is generally increased sensibility or tenderness of the scalp around the seat of suffering; and the digestive organs often betray disorder. The nervous system is susceptible and weakened. The pulse is seldom materially disturbed. This is only one of the numerous situations in which NEURALGIC AFFECTIONS (see the article) manifest themselves.

36. *B. Partial or limited Headach* is often excited by local causes of irritation. — Very severe pain in the situation of the frontal sinuses has been experienced, owing to the ova of insects having passed by the nostrils to this part. PLOUCQUET gives numerous references to cases where the larvæ of insects had occasioned intense pains. A servant in my own family suffered from this cause, the larva being discharged upon a violent fit of sneezing. Caries or disease of the fangs of the teeth is often the cause of partial headach, the pain being sometimes confined to a single spot on the same side of the head as that in which the cause of irritation is seated.

37. xii. DIAGNOSIS. — There is no class of affections which requires greater discrimination than this; and there is, perhaps, none which is esteemed more lightly by practitioners, or more empirically treated; the digestive organs being considered much too generally as the source of disorder. I believe that a careful investigation of the cases, and close observation of the juvantia and lædentia, will show that a greater number of them depend upon chronic inflammation of the brain, or of its membranes, than is commonly supposed. The diagnostic symptoms of each variety have been enumerated in the description of it; but the following summary may be given at this place: — (*a*) *Nervous headach* is distinguished by absence of constitutional disorder, by susceptibility of the nervous system, by the feeling of constriction, and the limited extent of the pain, by the natural temperature of the head, &c. (§ 11.). — (*b*) The *congestive* is characterised by the numb, dull or heavy, oppressive, and deep-seated pain; by languor of the circulation; by pallor or heaviness of the countenance; by dizziness, drowsiness, and want of animation; by the coolness of the scalp, and sometimes by fulness of the eyes and a bloated state of the face (§ 14.). — (*c*) *Plethoric* and *inflammatory headach* is manifested by the general, severe, rending and throbbing pain; by nausea or vomiting; by fulness of the vessels, or flushing of the face and eyes; by the full, hard, or oppressed pulse; and by the increased temperature of the head (§ 16.). — (*d*) The *dyspeptic* and *bilious* is evinced by dull, aching, or racking, or shooting pains, which move from one part to another, and are often attended by soreness of the scalp, by disorder of the digestive organs, and flatulence; by a loaded tongue, foul breath, and a morbid state of the secretions, especially the biliary (§ 18–21.). — (*e*) The *organic* is distinguished by internal acute pain, which becomes more and more constant or prolonged; by sudden retchings; by a quick, irritable, or irregular pulse; by the pain darting or shooting from one situation; by tenderness or soreness on pressure being felt, particularly when the bones are affected; by alterations in the sensibility and motions of a limb or limbs; and by symptomatic pains, spasmodic contractions, &c. (§ 25.). — (*f*) *Rheumatic* and *arthritic headachs* are readily recognised from the diathesis of the patient, and from the causes and characters of these affections. The rheumatic is generally connected with rheumatism of an adjoining part (§ 30.). The arthritic presents symptoms that cannot be mistaken, especially when viewed in connection with the history of the case (§ 31.). The description of these, and of the other forms of headach, has been so fully given, that nothing further respecting their diagnosis is requisite.

38. xiii. PROGNOSIS. — A favourable result may be anticipated of cases of the nervous, the dyspeptic, the bilious, the rheumatic, the aguish, and the hysterical headach. A guarded opinion should be given respecting the inflammatory, the arthritic, and the rheumatic when associated with increased vascular action in the internal membranes (§ 30.). When headach is accompanied with vomiting, without obvious disorder of the stomach having preceded the attack, an inflammatory affection of the brain should be suspected; and a prognosis, conformable with this view, ought to be given. A still more unfavourable opinion should be entertained if the locomotive powers, if the memory, if the senses, or if utterance or articulation become impaired. If there be sufficient evidence of disease of the brain, or of its membranes, great danger exists, although a fatal termination may be long delayed, or even deferred for some years, as in cases of palsy. If the pericranium be affected, and especially if the bones of the cranium be diseased, a very guarded, if not a very unfavourable, prognosis is necessary.

39. xiv. TREATMENT. — It is evident that the indications for the cure of headachs should be inferred from the nature of each; that remedies ought to be directed to their pathological conditions and relations, ascertained by a close examination of the states of the organic and locomotive functions, of the senses, and of the mental manifestations. And, although what has been advanced above may aid the inexperienced, or furnish useful suggestions to many, yet the successful administration of remedies in these affections will entirely depend upon accuracy of observation, and upon pathological and therapeutical knowledge previously acquired. — *A. Nervous Headach*, proceeding from depression or exhaustion, obviously requires the nervous energies to be restored by tonics and stimulants. These medicines, however, should be administered with due caution at first; as the more active of them, or too large doses, may excite fever, or even occasion vascular determination to the head. They ought not to be given, or continued long, until fæcal accumulations have been re-

moved by mild or stomachic purgatives, which should afterwards be prescribed occasionally, in conjunction with deobstruents, in order to preserve the excreting functions in a state of healthy activity. Whilst the head ought not to be kept too warm, the impression of cold must be prevented, at least until the organic functions have acquired their usual tone. In most instances, the milder tonics may be given, with the alkaline subcarbonates, or the aromatic spirit of ammonia, and with carminatives. The diet should be light and nourishing, the occasional causes avoided, and gentle exercise in the open air daily taken. In slight cases, these means, and a due regulation of the digestive functions, will remove the disorder; but, if they fail, those about to be noticed should be resorted to.

40. Nervous headach may prove obstinate, or it may be unusually violent from the commencement, or gradually become so. If, in these cases, the symptoms, especially those connected with the organic functions, the senses and cerebral manifestations, evince neither vascular action nor organic lesion within the cranium, tonics conjoined with anodynes, antispasmodics, or carminatives, according to the peculiarities of the case, should be resorted to. The preparations of cinchona, of valerian, of arnica, of assafœtida, and of ammonia; camphor in full doses; the æthers; the carbonate of iron, the nitrate of silver, &c., are then severally indicated, and may be given with opium, or with the acetate or muriate of morphia, or with hyoscyamus, or with belladonna, according to circumstances. If there be prolonged watchfulness, a suitable narcotic should be exhibited at, or shortly before, bedtime. I have found the following medicines of great benefit in some very severe cases of this kind, the pills (No. 245.) having been taken, in addition to the mixture (No. 246.), during the violence of the attack. An increased dose of the pills, or the anodyne draught, may also be given at night. *Formulæ* 24, 25. 36. 269. 367. 423. 539. 555. prescribed in the *Appendix*, also, may prove useful in this variety of headach.

No. 245. ℞ Camphoræ rasæ gr. xij.—xviij.; Extracti Hyoscyami ʒ ss.; Conserv. Rosarum q. s. ut fiant Pilulæ xij., quarum capiat duas, quartâ vel quintâ quâque horâ.

No. 246. ℞ Infusi Valerianæ ʒ x.; Sodæ Sub-carbonatis gr. xij.; Spiritus Ammoniæ fœtid. ʒ j.; Spiritus Lavand. Comp. ♏ xx.; Tinct. Aurantii Co. ʒ j. M. Fiat Haustus, quartis, quintis, vel sextis horis sumendus.

No. 247. ℞ Quininæ Sulphatis, Camphoræ rasæ, āā gr. x.; Extr. Aloës purif. gr. xij.; Extr. Hyoscyami ʒ ss.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ xxiv., quarum capiat unam, vel duas, vel tres, bis terve in die.

41. *B. Congestive Headach* should be treated according to the age, habit of body, and constitutional power of the patient; and to the local as well as general state of the circulation. It should not be overlooked, that vascular action in the brain, owing either to impaired vital power of the capillaries, and of the organ generally, or to impeded return of blood by the veins and sinuses, is insufficient for the due performance of the several functions of this part of the frame. — *a*. In *delicate* or *irritable* persons, stomachic or mild purgatives, tepid or cold sponging the head with fluids containing aromatic and fragrant substances, as lavender or Cologne water; derivatives, especially warm or stimulating pediluvia; the internal exhibition of camphor, ammonia, valerian, gentle tonics, &c.; light diet, and moderate exercise in the open air; will prove most serviceable. Local bloodletting will seldom be required, even in small quantity; blisters behind the ears will be productive of benefit, in some cases; and the effusion of tepid water on the head, in others. As the patient's strength improves, cold sponging the head or the shower bath, and friction of the scalp, will be useful in preventing a return of the affection. Where there is much irritability, the combination of hyoscyamus, or of small doses of the powder or extract of belladonna, with the medicines just named, and strict attention to diet, air, and exercise, will generally be found of advantage.

42. *b*. When this form of headach affects persons whose vital powers have been exhausted by dissipation and unrestrained indulgences, or those of a leucophlegmatic habit of body, the treatment should be still more restorative, tonic, or stimulant than the foregoing (§ 41.). Even local depletions will be injurious, and the cold affusion on the head will be of little service, unless the affection has followed the use of narcotics, or when the head is hot. Cordial stomachic aperients, warm spiced wine, or coffee; the preparations of ammonia, or of camphor, or of valerian, or of arnica, &c.; stimulating pediluvia; and blisters behind the ears, or on the temples, or even on the head, in extreme cases; are amongst the most appropriate remedies in cases of this kind. After these have relieved the more distressing symptoms, the complete removal of the disorder, and the prevention of a return of it, may be attempted, by promoting the digestive, the assimilating, and the excreting functions; by the use of tonics — of the preparations of bark or of iron; and by mild chalybeate and aërated mineral waters. But, before these are prescribed, the secretions and excretions should be freely evacuated, and their morbid states corrected, by alteratives and mild purgatives (F. 205. 266. 430.). And, during the course of restorative medicines, these should be frequently resorted to. The factitious mineral waters of Carlsbad, Marienbad, or of Pyrmont or Spa, subsequently may be cautiously tried; but those of Seidschutz or Pullna should, in many cases, precede the use of these.

43. *c*. When congestive headach occurs in the plethoric, the indolent, and well-fed; in persons about or past middle age, or who have experienced obstructions of the liver, or of any accustomed evacuation; the treatment should be very different from the above. General or local bloodletting, the affusion of cold water on the head, brisk cathartics, and derivation to the extremities by warm and stimulating pediluvia or manuluvia, are chiefly to be depended upon. But these will fail of being permanently useful, unless the diet of the patient be restricted, and regular exercise be taken in the open air. The secretions and excretions ought, also, to be freely and regularly promoted. A daily recourse to the shower bath will prove of great service.

44. *d*. When this form of headach proceeds from prolonged or intense mental application or exertion, not only should the above means be adopted, according to the age, strength, habit of body, and modes of living of the patient; but entire relaxation of the mind, change of air, travelling, the amusements of watering places, sea-voyaging, early hours, light reading, and

horse exercise, should be enjoyed, as circumstances may permit. At the same time, the mineral waters most suited to the peculiarities of the case may be taken, especially those that are deobstruent, aperient, and gently tonic; and, whilst the functions of digestion and assimilation are promoted by restoratives, and by breathing an open dry air, the secreting and excreting actions of the abdominal viscera should receive strict attention.

45. *C. Plethoric* and *Inflammatory Headach* requires the adoption of the means just enumerated (§ 43.), but in a much more active manner. The regimen ought to be strictly antiphlogistic; and permanent derivation, or counter-irritation, established by means of issues or setons in the nape of the neck, or of the tartar emetic ointment, or of croton oil, applied in this situation and in its vicinity. The bowels ought, also, to be copiously and frequently acted upon. When this form of headach follows the disappearance of accustomed discharges or eruptions, or of hæmorrhages, this treatment should be most strictly enforced, and the use of external as well as internal derivatives strenuously persisted in. (See Brain — *Congestion of*, § 139., and *Inflammation of*, § 191.)

46. *D. Dyspeptic* and *Bilious Headachs.* — *a.* The *former* will be remedied by the means advised in the article on Indigestion. I may, however, state in this place, that, when this headach is attended by nausea, and when it is clearly ascertained that the sickness does not proceed from inflammatory action within the cranium, an ipecacuanha *emetic*, vomiting being promoted by drinking chamomile tea or warm water, will generally give relief. After the stomach is evacuated, and the nausea is gone, a mild purgative, as the compound rhubarb pill; or the sulphate of magnesia, with carbonate of magnesia and a carminative spirit or tincture in an aromatic water; or rhubarb with magnesia or an alkaline subcarbonate, and any aromatic or carminative medicine, will give further relief, by changing the state of the secretions in the stomach and upper part of the intestines, and by promoting the excreting functions of the latter, and of the large bowels. If nausea be not present, these purgatives should be given forthwith, and repeated until the bowels are freely evacuated. Suitable light diet, exercise in the open air, and an occasional recourse to these or similar aperients, will prevent a return of the affection. I have found the following most serviceable, when given with this intention, in moderate doses. In larger doses, they will also remove the complaint.

No. 248. ℞ Pulveris Rhei ʒss.; Extr. Fellis Bovini, Extr. Aloës purificati, āā ℈j.; Saponis Duri gr. xv.; Pulv. Ipecacuanhæ, Pulveris Capsici, āā gr. xij.; Balsami Peruviani, Olei Carui, āā gutt. viij. Contunde benè simul, et massam divide in Pilulas xxxvj., quarum capiat unam vel duas, cum prandio, vel horâ somni.

No. 249. ℞ Infusi Gentianæ Comp., Infusi Sennæ Comp., āā ℥iij.; Sodæ Sub-carbon. ʒij. (vel Magnesiæ Sulphatis ʒvj.); Tinct. Jalap. ʒjss.; Tinct. Sennæ, et Tinct. Cardamom. Comp., āā ʒiijss. M. Fiat Mist., cujus capiat Coch. iij. ampla horâ somni, vel Coch. iv. primo mane.

47. *b.* When *bilious headach* seems to depend upon the congestion or accumulation of bile in the biliary passages, then chologogues, particularly calomel or blue pill, should be given, and followed, after a few hours, by a stomachic purgative, which should be repeated until a full effect is produced. In these cases, it will often be necessary to repeat the mercurial, as well as the purgative, oftener than once; the infusion of senna, or equal parts of it and of a tonic infusion, being given with an alkaline subcarbonate, or with a neutral salt and the extract of taraxacum, or the supertartrate of potash in large doses, with the confection of senna, and this extract. When the headach seems to proceed from an exuberance of acrid bile, then demulcents with cooling aperients, or with alkaline carbonates, saline medicines in a state of effervescence, and warm mucilaginous diluents, are generally useful. In cases of this kind, it is necessary to dilute the acrid secretions, to evacuate them from the bowels, and to protect the digestive mucous surface from their irritating operation. When the acridity of the bile is the consequence merely of its retention and accumulation in the biliary apparatus, then these means will be sufficient to remove disorder; but when it depends upon the exuberance in the blood of the elements whence bile is formed, or upon a morbid action in the liver, a vegetable or farinaceous diet, bland fluids, the alkaline carbonates and refrigerants in camphor mixture, regular exercise, especially of the muscles of the upper extremities and of the trunk, are then required. If the action of the liver is not improved by these means, recourse should be had to mercurial alteratives or aperients; and, if it be connected with vascular excitement of, or determination to, the organ, local depletions, antimonial preparations, diaphoretics and diuretics, external derivatives, and the antiphlogistic regimen, should be prescribed. In every case, fæcal accumulations and morbid secretions should be regularly evacuated by the means already advised.

48. *D. Organic* or *Cerebral Headach.* — When the patient complains of increased pain in the head on moving it, of spasms or pains in the limbs, or of impaired sensibility or motion of them, of sickness, and of any of the characteristic symptoms of this variety (§ 25.), depletions, general or local, according to the peculiarities of the case; deobstruent purgatives; internal and external derivatives, blisters applied on the nape or behind the ears and kept long discharging, setons or issues, low diet, mental and bodily repose, and local or general refrigerants, or diaphoretics, as circumstances indicate, then constitute the principal means of affording relief. After these have removed vascular excitement, small doses of the bichloride of mercury, or of the iodide of mercury, or of the hydriodate of potash, or of the ioduretted hydriodate of potash, or of the arsenical solution, may be prescribed, and continued until the effects are ascertained. But external derivation should be also persisted in. (See also arts. Brain, § 211. 222., and Palsy.)

49. *E. Pericranial Headach.* — When the affection proceeds from disease of the pericranium or of the cranial bones (§ 26.), the treatment is essentially the same as that just advised (§ 48.); but it may be modified to meet various peculiarities and changes. If the affection is syphilitic, the bichloride of mercury, or the iodide of mercury, or the other preparations of iodine above mentioned, may be employed. If the periosteum, or the bone, be diseased, an incision should be made down to the affected part, and a free discharge afterwards maintained, as successfully

practised by Mr. Pearson and Sir B. C. Brodie. If this affection have proceeded from inflammation of the ear, the discharge from the external meatus of the organ should be allowed a free egress. (See Ear — *Inflammation of*, § 26—29.)

50. *F. Rheumatic* and *Arthritic Headachs* should be treated with strict reference to the diathesis or constitutional disorder. — *a.* If *rheumatic headach* is not associated with inflammatory action of the membranes, the head should be kept warm, and the secretions and excretions freely promoted and evacuated. After biliary and fæcal accumulations have been carried off, camphor, ammonia, and colchicum, may be given in conjunction; or one or more of these may be taken with bark or any other tonic; or with magnesia, or with the subcarbonate of soda or potash, especially when the urine deposits a copious sediment, or is acid. If severe symptomatic fever, or signs of inflammatory action in the cerebral membranes, accompany the rheumatic affection of the head, local depletions, antimonials, active cathartics, and derivatives, should be prescribed, and colchicum freely exhibited. But, when these symptoms are absent, either of the following medicines will generally give relief; a full dose of calomel, or of blue pill with James's powder, or some antimonial, having been taken at bed-time, and a stomachic purgative the following morning, and repeated according to circumstances: —

No. 250. ℞ Camphoræ rasæ, Quininæ Sulphatis, Pulveris Radicis Colchici, āā gr. xviij.; Extracti Hyoscyami ʒ ss.; Conserv. Rosar. q. s. M. Fiant Pilulæ xxiv., quarum capiat duas, bis terve in die, — vel

No. 251. ℞ Sodæ Sub-carbon. ℈ j.; Tinct. Colchici Comp. ʒ ss.; Tinct. Cardamom. Co. ʒ j.; Decocti Cinchonæ (vel Infusi Cascarillæ) ʒ x.; Spiritus Lavandul. Comp. ♏ xij. M. Fiat Haustus, ter in die sumendus.

51. *b. Arthritic headach* sometimes requires local depletions, from the nape of the neck and from behind the ears, especially in plethoric or robust persons; but a too great quantity of blood should not be taken away. The lower extremities ought to be put in warm water, containing flour of mustard and salt; and if the headach is not very much relieved by these means, mustard poultices may be applied to the feet. *Colchicum* should also be prescribed, with aperient or purgative medicines, and with magnesia, or the alkaline carbonates, as recommended in the article Gout (§ 55. 82. *et seq.*). In these cases, the colchicum, when given in small or suitable doses, and continued for some time, in order to insure its action on the liver and on the kidneys, seems to favour the elimination of the superabundant urea from the blood; a great excess of this substance in the circulation being generally connected with the production of the gouty affection, in all its modes of manifestation. As urea is the sum or ultimate product of assimilation, or results from a combination of the effœte elements of human organisation; and as it is liable to accumulate in the blood when the functions of excretion are impaired, owing to weakened organic nervous power (see art. Gout, § 40 – 42.); so it is not improbable, that, when it is thus superabundant, it becomes an excitant not only of morbid or altered sensibility, but also of increased vascular action, and of local determination, — that, in short, it is the *materies morbi* of the ancients, and one of the forms which effœte and excrementitious elements in the blood assume; and that it constitutes a part of the morbid condition, of which I have shown gout to be the chief manifestation. This view is supported by the experiments of Prout, Chelius, and others, showing the superabundance of urea, and its combinations in the urine, when the actions of the kidneys are freely exerted, towards the decline of the gouty attack.

52. *H.* It is unnecessary to enter into the treatment of the other *symptomatic varieties of headach*, inasmuch as the means of cure for them are essentially the same as are fully stated in the articles on those diseases, of which headach is a frequent symptom. — *a.* When the pain is *intermittent*, independent of organic lesion, and one of the forms which *masked ague* assumes, then a full dose of calomel, with James's powder, or of any other mercurial alterative, at bed-time, a brisk cathartic draught early the following morning, and, after the operation of these, the sulphate of quinine with camphor, or the preparations of bark and serpentaria, will remove the affection. — *b.* If the headach be *hysterical*, the means already advised for *nervous headach* (§ 40.) will generally remedy it. If, however, the pain be symptomatic of disorder of the uterine, or of the urinary, functions, the means of cure must be directed to the restoration of these functions to the healthy state, as shown in the articles on Menstruation, Urine, and Uterus; and to the removal of vascular plethora, by evacuations and derivatives, especially when the affection depends upon this state of the circulation, or arises from suppressed or diminished secretion or excretion. (See *Treatment of Plethoric* Headach, § 45.) — *c.* The headach attending *hypochondriacal affections* is frequently relieved by the means advised for dyspeptic and bilious headachs (§ 46.); but the treatment may be conducted in all respects as directed in the article on Hypochondriasis. — *d. Local* or *neuralgic headachs* (§ 35.) require the removal of the cause of irritation, when it can be accomplished, and generally the means already advised for the nervous and congestive varieties (§ 40—44.), — sometimes a constant and energetic action to be exerted upon the intestinal canal, — frequently the exhibition of tonics, stimulants, and narcotics, or anodynes, — occasionally external irritants, or vesicatories, as moxas, croton oil applied to the surface, the tartar emetic ointment, issues, blisters, &c., — in some instances, the application of narcotics, as veratria, &c., to the part affected, or of the acetate of morphia to the skin denuded of its cuticle, and the other means mentioned in the article on Neuralgic Affections.

53. xv. Brief account of Remedies recommended by Authors. — *A. Evacuants.* — *a. Emetics* have been advised for headachs by Cælius Aurelianus, Horstius, Ruland, Riedlin, and Frank; and are often of great benefit when the pain proceeds from injurious ingesta, from the accumulation of bile in the biliary passages, or from impeded circulation in the vena porta. — *b. Purgatives* are not less useful; and have been very generally, but often empirically, prescribed for headachs. Selig trusted chiefly to them for the removal of the intermittent form of the affection. Considerable judgment is, however, requisite in the selection of medicines of this class, and in the combination of them with other substances, so as to secure all

the advantages they are calculated to afford. Aretæus, and many others of the ancients, employed *hellebore*. When the pain arises from accumulations of bile, or from obstructions to the excretion of this fluid, then *calomel*, conjoined with some other purgative, and occasionally also with antimony, or with ipecacuanha, is most appropriate. In the nervous, the congestive, the dyspeptic, the periodic, and in the hypochondriacal forms of headach, the stomachic purgatives prescribed above (§ 46.), or the combination of a purgative with a tonic, carminative, or aromatic, &c. (F. 215. 266. 379.), will be found most serviceable. — *c. Vascular depletions* are requisite in plethoric and inflammatory headachs. *Bleeding* from the arm, sometimes from a vein in the foot, or *cupping* on the nape, are the most eligible modes. Aretæus, Cælius Aurelianus, and Velschius, preferred cupping on the head itself. I have repeatedly directed it to be performed on the occiput, behind the ears, or on the temples; and, when a small quantity of blood is to be taken away, these are often preferable situations. *Leeches* may be applied in circumstances similar to those requiring cupping. *Arteriotomy* has received the sanction of Aretæus, Schenck, Wepfer, Willis, Zacutus Lusitanus, and of many recent writers; but I believe that it possesses no advantages above the other modes of vascular depletion, even in the most inflammatory form of the complaint. — *d. Sudorifics* are most beneficial in the febrile, inflammatory, rheumatic, and periodic states of the affection. In the last of these, they have been prescribed by Morgagni. The selection of sudorifics or diaphoretics should be guided by the state of the general circulation, and of vascular action in the head. When either the former or the latter is excited, *tartarised antimony*, in frequent doses, or *James's powder*, and the more refrigerant diaphoretics, are most appropriate; but when the head is cool, and the pain is connected with rheumatism, depression of vital power, and suppressed cutaneous function, the *warm*, or *vapour bath*, *camphor*, the *mistura guaiaci*, or weak infusions of *serpentaria*, or of *arnica*, or of *briony*, will be more beneficial than antimonials, unless these latter be conjoined with opiates and restoratives.

54. *B. Stimulants and Antispasmodics.*—These are serviceable chiefly in the nervous, the rheumatic, the hypochondriacal, and the neuralgic forms of headach, and sometimes in the intermittent, the congestive, the dyspeptic, and hysterical.—The medicines of this kind most commonly prescribed are, the preparations of *camphor* and *ammonia*, the *succinated* and *fœtid spirits of ammonia*, the *æthers*, *castor*, *musk*, *serpentaria*, *spirits of lavender*, &c.—Besides these, preparations of *arnica* have been recommended by Selig, Dumangin, and J. Frank; *cajeput oil*[*], by Thunberg; a strong infusion of *coffee*, by Baglivi and Percival; an infusion of *verbena*, *betonica officinalis*, and *semina coriandri*, by J. Frank; and the *ledum palustre* by Linnæus. *Valerian* has been praised by Strandberg and Fordyce. I have found the infusion, with the ammoniated tincture, of valerian, or the fœtid spirit of ammonia, of great benefit in the headachs just mentioned. *Black pepper* has been recommended by Lange in the dyspeptic variety; and its active principle, *piperine*, has been employed in the intermittent form of the affection. *Guaiacum* has been prescribed by J. Frank in rheumatic and arthritic headachs. It is of service in combination with colchicum and magnesia, or with an alkali. *Green tea* and *coffee* are very commonly resorted to in the above forms of headach, as domestic remedies.

55. *C. Tonics.* — *a.* The preparations of *bark* are generally beneficial in the periodic and non-inflammatory kinds of this complaint. The *sulphate of quinine* is now generally preferred; but, in many cases, the decoction of cinchona, with the compound tincture, and an alkaline subcarbonate, will be more efficacious. — *b. Absinthium* was most frequently employed by the older writers. Riverius conjoined it, or other bitters, with purgatives; a practice deserving of more general adoption. — *c.* The *cascarilla bark* was used, for nervous and dyspeptic headachs, by Riedlin; and is excelled only by cinchona. — *d.* The *muriate of ammonia* is also of service in the nervous and intermittent varieties. — *e.* The *arsenical solution* was praised by Darwin. I have prescribed it, and taken it myself, for headach, with marked benefit. — *f.* The *muriate of baryta* was recommended by Hufeland, for the pains proceeding from, or connected with, scrofulous disease. — *g.* The preparations of *iodine* are, however, more deserving of adoption, when the complaint is thus associated, and when it depends upon organic lesion. They may be given with any of the narcotics about to be mentioned. I have lately proved their efficacy in the rheumatic variety of headach, arising from the gonorrhœal infection. The *hydriodate of potash* is preferable in this latter form; and, indeed, in several others. — *h.* The extract of *nux vomica* is mentioned by Horn, and may be given in small doses, as a tonic, in the nervous, the rheumatic, and the hypochondriacal varieties; but its effects must be carefully watched. It is preferable to the active principle, *strychnine*, which should be prescribed only in very minute doses.

56. *D. Narcotics* and *Anodynes* have been employed in several of the varieties of headach, both externally and internally. — *a. Opium*, in various forms, has been directed by Whytt, Mursinna, J. Frank, W. Stokes, and many others; especially in the nervous, the rheumatic, and intermittent kinds of the complaint. The *acetate* and *muriate of morphia* are now generally used; but they, as well as other preparations of opium, should be conjoined with camphor, or with an aromatic, in order to insure their good effects. — *b. Aconitum*, in the form principally of extract, was praised by Stoerck and Vogel; and was once much employed in rheumatic and chronic headachs. It is certainly often beneficial in these, as well as in the nervous varieties; but it should be given in small doses, and its effects carefully observed. *Aconitine*, the active principle, is to be preferred as an external application, in the neuralgic or rheumatic states of the complaint; but even in these it requires the utmost caution. The powder of the root, or of the leaves, may sometimes be ordered with advantage. I was lately consulted in a case where the incautious employment of aconitine caused an apoplec-

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[*] Humberg prescribed the cajeput oil externally; but I have ordered it to be taken internally, and with great benefit.

tic seizure, and hemiplegia. — *c. Belladonna* has been used in somewhat similar cases to those for which the aconitum has been exhibited. The extract, or the powder of the root or of the leaves, may be given, either alone, or with camphor, or an aromatic. I prescribed it in a case of hypochondriacal headach, with much benefit. — *d. Hyoscyamus* has likewise been recommended by Stoerck, Renard, and others. I have found it of great use when combined as just stated, or when conjoined with ipecacuanha and some stimulating antispasmodic, and given in a decided dose. — *e. Conium* was directed by Lettsom; the distilled *laurel-water*, by J. Frank; and the *prussic acid*, by Good. *Digitalis* is considered by Frank as very beneficial in the headach proceeding from scrofulous disease. — *f. Stramonium* has been prescribed by several writers. I have seen it given with benefit.

57. *E. Alteratives* are required whenever the affection of the head appears to depend upon a morbid state of the secretions, upon impaired action of the chief excreting viscera, or upon an impure state of the circulating fluids. — *a.* Of these, *mercurials* are the most active, and most generally used, both internally and externally, for this complaint. *Calomel* was prescribed largely by Wepfer, Velschius, Bang, &c. It is most serviceable when the headach depends upon accumulations or obstructions of the bile, and a torpid state of the bowels, and when conjoined with, or followed by, other purgatives. In the rheumatic form it is advantageously conjoined with antimony and opium. The *blue pill* may be prescribed on similar occasions, and in the same manner. The *bichloride of mercury* was preferred by Lentin, De Moneta, Van Swieten, and Gmelin, especially in the headachs depending upon organic lesions within the cranium, or upon disease of the bones. In these, as well as in some other cases, it may be prescribed in a tonic tincture or decoction. The *iodide of mercury* may be used in similar circumstances. Mercurials were pushed to *salivation* by Willis, Lentin, Nück, Bang, Darwin, and Blane; but this effect is rarely required unless when the pain resists all other means, or proceeds from a syphilitic taint. — *b. Alkalies*, particularly the subcarbonates of soda or of potash (Thilenius), the solution of potash, or Brandish's alkaline solution, are often of service, when given in tonic or aperient infusions or mixtures, and aided by the decoction or extract of *taraxacum*. — *c.* An infusion of two or three drachms of the *clematis vitalba*, in a pint of boiling water, was recommended by Stoerck and Muller, to be taken in the twenty-four hours. — *d.* The decoctions of *sarsaparilla* are more deserving of adoption, and may be made the vehicles for the exhibition of other medicines which produce an alterative effect, as the bichloride of mercury, the hydriodate of potash, the alkalies, the extract of taraxacum, &c. — *e.* The *alkaline chlorides* may be also tried. — *f.* The precipitated *sulphur* will be found beneficial in the rheumatic form of the complaint, if taken daily in sufficient quantity to exert a gentle action on the bowels. — *g.* The preparations of *colchicum*, when given in small doses, and conjoined with magnesia, or with sarsaparilla and the alkalies, also exert an alterative operation, as explained above (§ 52.); and are of great use in the arthritic and rheumatic forms of the affection. — *h.* Various *mineral springs* are extremely serviceable; but they require to be appropriately prescribed. Those containing iron, fixed air, lime, or the alkaline carbonates, are most suited to the nervous, neuralgic, rheumatic, and dyspeptic varieties; those holding sulphur, &c., in the rheumatic, arthritic, bilious, hypochondriacal, &c.; and those containing the purgative salts, in the bilious, arthritic, hypochondriacal, &c.

58. *F. Derivatives* — whether those which exert an immediate and brief effect, or those which act more slowly but permanently — are of great benefit in several forms of headach. — *a.* To the former class, *purgatives* may be said to belong; as they not only increase secretion and excretion, but also determine the fluids to the digestive canal. — *b. Masticatories* were employed for headachs by Celsus, Aretæus, Forestus, Muralt, and many others; but they have now fallen into disuse. Nevertheless, they are frequently of service. — *c.* The same remark applies to *sternutatories*, which have been recommended by the same writers, and have experienced the same fate. The benefit derived from various *cephalic snuffs* is undoubted, even in cases that have resisted other means; and has led to their adoption as empirical remedies, in irregular and domestic practice. They are beneficial in exciting the olfactory nerves, and thereby the cerebral functions, and in procuring a defluxion from the Schneiderian membrane. — *d. Warm pediluvia* and *manuluvia* are often resorted to, especially when the extremities are cold, or when the pain depends upon determination of blood to the head. In these circumstances, the addition of mustard and of salt to the water will be of service. — *e. Sinapisms*, and *stinging* with nettles, or *urtications*, were employed by the ancients in the treatment of headach. Celsus, Aretæus, and others, directed sinapisms to the head, over the seat of pain; but Themison contended for their application to the lower extremities. — *f. Blisters* on the nape, sometimes on the extremities, are now more generally prescribed. — *g. Setons* and *issues*, in these situations, or in the arm, are commonly recommended in the more obstinate cases of the complaint; and when the pain is suspected to arise from organic lesion. They are praised by Riverius, Zacutus Lusitanus, Holler, Fabricius Hildanus, Heister, Purmann, and De Haen. I have prescribed them in several cases with benefit. — *h.* The *tartarised antimonial ointment* has also been of advantage when applied on the nape of the neck, and its effects on the integuments fully procured.

59. *G. Topical Means.* — *a.* The application of *cold* to the head or temples, in various modes, has been advised by most writers, when the pain proceeds from determination of blood to, or inflammatory action of, the brain or membranes. A recourse to the *affusion* of cold or tepid water on the head; and the repetition of either, according to the grade of vascular action in it, are often preferable to the continued application of great cold, which is sometimes productive of mischief. Cold sponging, cold lotions, or epithems, wetting the forehead and temples with æther, or with aromatic waters, &c., and the shower bath, are severally of benefit, especially in the plethoric or inflammatory states of the affection; but the *douche*, or

affusion, should be preferred in the congestive form, especially when caused by narcotics. — *b. Warm applications* and *warm coverings* on the head have been sanctioned by Celsus, Lange, and many others. In nervous and rheumatic headachs especially, they are frequently of great service. Alexander Trallianus prescribed them in the form of emollient fomentations. Diemerbroeck and Marcus directed fomentations with aromatic herbs; and J. Frank warm epithems, moistened with a decoction of *verbena* and *betonica officinalis.* Hot *sinapisms* applied over the affected part have been resorted to by some of the ancients (§ 58.). — *c. Blisters* on the head are occasionally of service, especially in the congestive and rheumatic varieties of headach; but they require much discrimination. They have been applied to the scalp by Riverius, Schrader, Bang, Pouteau, Aubert, Monro, and others; but, unless in some cases of the varieties just stated, they are more useful behind the ears, where they may be kept open for some time, or often repeated. — *d. Stimulating liniments* (F. 299. 311.), rubbed assiduously on the scalp, are sometimes of service, when cautiously prescribed, in nervous, rheumatic, and neuralgic headachs, or hemicrania. Liniments, also, containing *acetate of morphia*, or the extract of *belladonna*, or of *aconitum*, or of *hyoscyamus*, or of *stramonium*, or of *opium*, have been advised, by several writers, to be rubbed upon the scalp, in obstinate cases of this kind. I have found them of service in several instances, although it was doubtful whether they, or a full dose of acetate of morphia, given with aromatic spirits, that was also prescribed in some of the cases, had produced the effect. Very recently, ointments, containing *veratria*, *aconitine*, or other acro-narcotic substances, have been directed to be similarly applied in these affections. I have seen benefit derived from them in two or three instances; but I have known others where they either failed in giving relief, or seemed to be injurious. The propriety of having recourse to them is often doubtful. — *e.* The tartarised *antimonial ointment* may be used in the varieties of headach just mentioned, or even where organic lesion within the cranium is suspected; but the effects of it, as well as of liniments, ought to be carefully watched. — *f. Frictions* of the scalp have been advised by Gilbert and others, and have been of advantage when regularly and assiduously practised. — *g. Compression* of the carotids, although suggested by Serapion and Parry, is undeserving of further notice. The same remark is applicable to strait *cinctures* of the head, advised by some writers. — *h.* The *actual cautery*, applied to the seat of pain, has been recommended by Hippocrates, Celsus, Aretæus, Velschius, Aulagnier, Valentin, and by other ancient and modern writers. It is, however, reprobated by Cælius Aurelianus, and is now rarely had recourse to. — *i.* The application of *moxas* — a modification of this practice — has been long adopted in Eastern countries; and has been advised by Pascal, Saissy, Larrey, J. Frank, and others. Wepfer advises the moxas to be placed in the course of the coronal suture; Pouteau, on the vertex; and Velschius, on the temples. — *k. Incisions* of the scalp, in the seat of pain, have been directed by Le Bruyn, Severinus, Grateloup, Tissot, and Sumeire. They are more serviceable in disease of the pericranium, or of the bones of the cranium. *Issues* in the scalp have been sanctioned by Purmann and many others. I have seen benefit accrue from them in two instances. — *l. Electricity* and *galvanism* have been recommended by many in headachs; but they produce merely a temporary benefit, and are not always safe. — *m. Trephining* the cranium has been favourably noticed by Baglivi, Morgagni, Meekren, Marchetti, Vogel, Schmucker, and Good, and actually practised by some of them. It is only when the pain is very violent, confined to a single spot, has followed an external injury, and resists all other means, that the practice can be entertained. Mr. S. Cooper states, that he has seen two cases, in which the patients lost their lives by this treatment. — *n.* The *extraction of carious teeth* should not be neglected in hemicrania, or local pain of the head from this cause. In a case where this object could not be accomplished, and in another where it was objected to, I directed a strong solution of the acetate of morphia, to which aromatic spirits were largely added, to be rubbed upon the seat of pain; and complete relief was obtained. The application of *créosote* to the tooth, or of camphor, acetate of morphia, and capsicum conjoined, has also been of service.

60. In the sketch here given, I have mentioned only such means as seem deserving of a trial, or are calculated to be of service in some one or other of the numerous forms and circumstances in which headach is presented to the practitioner. I have furnished suggestions merely; but these will be useful even to the most experienced. The advantage to be derived from them will entirely depend upon the pathological acumen by which their application to particular cases may be guided.

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HEARING — Impaired or Lost.

Classif. — 4. *Class*, 1. *Order* (*Cullen*).
4. *Class*, 2. *Order* (*Good*). IV. Class,
III. Order (*Author*).

1. Those diseases of the organ of hearing which are not necessarily attended by impaired function, were considered under the article Ear. At this place, therefore, diminution, or loss of hearing — *Deafness* — will be considered with reference to the lesions which usually occasion it, and to appropriate treatment. The disorders of hearing may be divided into — 1st, *Exaltation of this sense*; — 2d, *Depravation of hearing*; — 3d, *Impaired or lost hearing*. — The *first* of these is merely symptomatic, and is observed chiefly in affection of the brain, and in fevers (see art. Symptomatology); the *second* is fully considered at another place (see art. Ear, § 2.); the *third* only remains for discussion.

2. Before entering upon the consideration of the various lesions causing deafness, directions as to the best mode of inspecting the ear are required, as, unless the auditory passage be carefully examined, the diagnosis of affections of the ear must necessarily be very defective. — In consequence of the curvature of this passage, the bottom of it and the membrana tympani cannot be distinctly seen, unless the patient's head be very much inclined to the opposite side, the ear directed to the sun, or a strong light reflected into it, and the auricle drawn well upwards and outwards, whilst the tragus is pressed outwards. The rays of light may thus be made to fall upon the bottom of the meatus, provided that the external ear be sound. But when it is the seat of morbid changes, a *speculum* is requisite in order to convert the curvature of the passage into a straight line. This instrument should be nearly round, and funnel-shaped, the inside of the arms being blackened, or rendered dim. When the ear is examined with the aid of the speculum, the light of the sun, as recommended by Dr. Kramer, should be preferred; but the light reflected from a small mirror may be employed.*

3. I. Deafness from Affections of the External Ear. — i. *Diseases of the Auricle*, especially erysipelatous inflammation extending to it, and boils, may impair the function of hearing, but never in a remarkable manner, nor permanently, unless the inflammation has extended to more internal parts; a circumstance which occasionally takes place. Dr. Kramer notices the occurrence of scirrhus of the auricle, as a cause of deafness; but it is very rarely seen.

4. ii. *Diseases of the Auditory Passage and Membrane of the Tympanum.* — All affections of these parts are either inflammatory, or the consequence of inflammation in some one grade or other, affecting one or more of the tissues in this situation. The fact is ably supported by Dr. Kramer, who remarks, that the different forms of disease seated in the auditory passage depend upon inflammation of the constituent structures, and they are characteristically defined, as one or other structure is affected. — The effects, therefore, of these inflammations can hardly be considered separate states of disease, unless they continue after the inflammation which caused them has disappeared.

5. *A. Erythematic inflammation of the auditory passage* generally causes accumulations of brownish hard wax, obstructing more or less the

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* Writers on the diseases of the ear, with few exceptions, advise various instruments, each finding fault with those proposed by others; each lauding his own practice, and each detracting from the merits (such as they are) of his contemporaries. In this, however, the despised aurists do not stand alone; for all those who take a single organ under their especial protection — and what organ has not been thus distinguished? — belong to the same category, as they are most anxious entirely to appropriate the object of their adoption, and evince the utmost rancour to those who attempt to encroach on their province. Verily, of all empirics, the regular in respect of qualification is the most uncompromising, and the most degrading to medical science and the character of the profession.

function of the organ. It sometimes occurs in persons of a cachectic habit of body, or in conjunction with chronic affections of the skin, and in connection with disorder of the digestive and excreting organs. It is often excited by substances that have passed into the ear, or by neglect of cleanliness, which, however, is not so frequent a cause as is generally supposed; the accumulation of hardened or morbid wax, with increased sensibility, pain, or soreness in the meatus, being the chief indications of the affection. In its slighter states, itching or formication in the passage is only felt.

6. The *Treatment* of deafness from this cause consists chiefly of syringing the meatus with tepid water, and of attending to the digestive and excreting functions, and to the general health. Mr. BUCHANAN recommends a small syringe with a slender point to be employed, fearing that the *membrana tympani* may be ruptured by the quantity of fluid injected, and by obstruction to the counter-current by the point of the instrument being too thick. Dr. KRAMER, however, considers that this precaution is unnecessary, as the membrane cannot be injured by the stream of water, and as the loosened wax will readily flow out with the water. He therefore uses a syringe that will contain an ounce and a half of water, the pipe being three quarters of an inch long, and the opening wide enough for a strong stream.

7. *B. Deafness from inflammation of the follicles of the auditory passage*, seldom is considerable, until the inflammatory action has given rise to some lesion of structure. — *Mucous or catarrhal otorrhœa* (see art. EAR, § 18.) is caused by the affection of these glands. From this inflammation, and from that of the *membrana tympani*, various excrescences or morbid growths in the meatus ultimately proceed. On inspection, redness and partial swelling of the walls of the passage are first observed; and, if the affection continues long, or becomes chronic, excrescences, or polypi, of a soft, spongy, or vesicular appearance, are gradually formed. These are red, sensitive, roundish, pedunculated, and readily bleed when irritated. In some cases, they have a broad hard base, are insensible, and not disposed to bleed. These obstruct more or less the meatus, and impede the functions of the organ. Hardened mucus and wax may also accumulate in the passage, as a consequence of the chronic states of this affection, and of the obstruction caused by these excrescences.

8. The *Treatment* of this disease should be directed according to the method just advised (§ 6.). The extirpation of the fungous growth should be performed; but, as M. ITARD has stated, the deafness may continue nevertheless; for the membrane of the drum may be thickened, or ulcerated, or covered by inspissated secretions; and otorrhœa will often long remain. In these cases, injections of tepid water, or of emollient and diluent fluids; blisters on the nape, and kept open, or setons or issues; and the means advised for the removal of *mucous otorrhœa* (see art. EAR, § 29.) should be prescribed.

9. *C. Deafness caused by phlegmonous inflammation of the cellular tissue* of the passage, rarely occurs: but this affection may be mistaken for the preceding; from which, however, it is readily distinguished by its rapid course, and termination in abscess, — results never observed in inflammation of the follicles. Owing to the severity of the pain, and other symptoms, it may be confounded with inflammation of the internal ear; but, in this case, the external passage never presents any lesion on inspection, at least at the commencement. — This disease is usually *caused* by cold or currents of air.—The *treatment* is altogether the same as recommended for *external acute Otitis* (see EAR, § 27.).

10. *D. Inflammation of the periosteum of the passage*, is most common in children of a scrofulous diathesis, and generally occasions caries of the bony structure, which is readily detected with the probe. If exfoliation of the diseased bone occur, and the ulcerated part begins to heal, narrowing or obliteration of the meatus may take place. In these cases, the deafness often depends as much upon congestion of the adjoining parts, as upon swelling and disease of the passage.—Dr. KRAMER advises, in the *treatment*, that, when the parts show a tendency to close, they should be opened up by art, and maintained open by touching them with lunar caustic, throughout their extent. Hearing, however, usually continues very dull, owing to the natural form of the meatus having been lost, and to the membrane of the drum having become thickened.

11. *E. Deafness from disease of the membrane of the drum.*—It has been supposed, that relaxation of this membrane, that too great tension of it, that rupture of it, and that rupture of the tendon of the *tensor tympani*, may severally occasion impaired hearing. CLELAND, SAISSY, BECK, and others, think that these lesions may be produced by violent sneezing, by claps of thunder, by noises of artillery, &c.; but, as KRAMER contends, these suppositions are unfounded; rupture of these parts never occurring unless from inflammation and its consequences. He remarks, that perforation of the membrane is in rare cases met with, little or no mucous or purulent discharge having been observed; but, even in these, upon examination, in a bright sunshine, with the speculum, a viscid, mucous, or puriform matter is always found at the bottom, and the remaining portion of the membrane is seen, reddened, thickened, and opaque.

12. *a. Inflammation of the membrane of the tympanum* most frequently occurs in connection with inflammation of one or other of the structures of the meatus, especially of the follicles. It may, however, take place primarily, and constitute the chief affection. Acute inflammation of this part is not so common as the sub-acute and chronic states; and either, when neglected, gives rise to opacity, thickening, perforation, purulent discharge, fungous or polypous excrescences, &c.; but the chronic states most frequently induce these lesions. In acute inflammation, the membrane is seen, on careful examination, more or less red, rough, swollen, and opaque. It often seems as if covered with small projecting glands or follicles. Sometimes bundles of vessels are seen in it, and the point of insertion of the handle of the malleus cannot be distinguished. Dr. KRAMER states, that inflammation of this part are distinguished from internal inflammations of the ear, not only by the greater mildness of the former, but especially by the changes of

the membrane presented by them from the commencement; whereas, in the latter, such changes cannot be detected early in the disease, however violent the symptoms and attendant fever may be; and occur only in the further course of the malady, when the membrane is about to burst from the pressure of accumulated matter, or has become involved in the inflammatory process. The different grades of this disease have been imputed to *nervous otalgia*, or confounded with it. Dr. Kramer, however, denies the existence of such an affection. In this he is evidently mistaken (see Ear, § 6.); although it must be admitted, that both this, and other inflammatory diseases of the ear, are often improperly viewed as nervous merely. The hardened secretion in the meatus, to which the more chronic states of inflammation of the membrane have been imputed, is more commonly the result of inflammatory action, than its cause. The disease, in both its primary and its consecutive states, generally impairs hearing more or less.

13. The *Treatment* is the same in this as in the other inflammatory diseases of the meatus; and as directed for *inflammations of the external* Ear (§ 27. 29.). — Dr. Kramer, however, prefers injections containing the acetate of lead; and pours a solution, varying in strength, from one grain to ten of the salt to an ounce of water, into the diseased ear, twice or thrice a day. Injections of a solution of the nitrate of silver, or of the sulphate of zinc, or of alum, have been also recommended; but unless they be weak, they often occasion pain and irritation in the meatus. A few drops of pyroligneous acid, to an ounce of water, have likewise been used as an injection. Both it, and the superacetate of lead, will effectually remove the offensive odour of the discharge.

14. *b. Deafness from perforation of the membrane of the drum.* — Kramer states "that many authors, and among them even Itard, are of opinion that perforation of this membrane does not necessarily weaken the hearing." Now this not altogether just: for M. Itard contends, that, when the opening is small, the hearing in some cases is not materially impaired; although in the great majority it is more or less so; but that, when it is considerable, or when a large portion of the membrane is destroyed or detached, hearing is always very much injured. Although perforation of the membrane causes deafness, yet there are states of the ear, and even of the membrane itself, in which *artificial perforation* of it may be attended by some benefit. Such states are, however, few; and the instances of success from the operation have been rare or equivocal.

15. *Artificial perforation* of the membrane was first performed by Sir A. Cooper, many years since; but the circumstances requiring the operation were not fully understood, until explained by Deleau and Kramer. The latter of these writers remarks, that Sir A. Cooper supposed perforation of the membrane to be indicated chiefly in cases of obstruction of the Eustachian tube, and in extravasation of blood in the cavity of the tympanum; but, as he appears to have been unacquainted with catheterism of this tube, his diagnosis of the closure of it was altogether uncertain. Even supposing these morbid states actually to exist, they may be treated more efficiently by introducing the catheter into the tube itself, than by perforating the membrane. Itard contends, that the operation is admissible only when there is invincible obstruction in the tube; Saissy advises it only in thickening and hardening of the membrane; and Deleau recommends it also in this case, as well as in obstruction or obliteration of the Eustachian tube, and in obstruction of the cavity of the tympanum. Dr. Kramer has recourse to the operation only when the *membrana tympani* is much thickened, quite insensible to the probe, hard as cartilage, and if the hearing is very impaired; but, even in this case, it should be performed only when both ears are affected with considerable deafness, and when the ear to be operated upon does not suffer from any other disease, by which the result might be rendered abortive.

16. II. Deafness from Disease of the Eustachian Tube and Cavity of the Tympanum. — i. *Affections of the Tube.* — The Eustachian tube may be obstructed — 1st, By the pressure of tumours in its vicinity; — 2d, By inflammation causing tumefaction of the mucous membrane, effusion, &c.; — and, 3d, By the more remote consequences of inflammation, namely, constriction or obliteration of a portion, or of the whole, of the canal. — Before, however, any of these can be accurately ascertained, it is necessary to have recourse to means of exploration similar to those employed in obstructions of some other canals. The introduction of tubes or catheters into the canal, in order to ascertain the nature of, and to remedy, various affections both of it, and of the cavity of the tympanum, has been resorted to by Sabatier, Wathen, Douglas, Saissy, Itard, and others. Through this tube, lukewarm water was sometimes injected by these writers, in order to judge of the state of the middle ear, according to the sensations produced by it, or by the total absence of sensation. Deleau and Kramer, however, rejected the use of water as an injection; and adopted the suggestion of Cleland, to employ air instead of water, in the investigation and treatment of diseases of the tube and cavity of the tympanum. Dr. Kramer recommends the usual silver inflexible catheters to be used; and air, compressed in an apparatus he describes, to be injected through it in the following manner: — "After the catheter has been introduced into the tube, and fixed by means of a frontlet, the patient is placed close to a table, on which he leans his elbow, holding with the hand of that side the pipe of the air-press filled with compressed air. The operator then introduces the metal beak of the pipe into the funnel-shaped dilatation of the catheter, applies his ear close to that which is being examined, opens the cock of the machine and listens to the sound, caused by the air rushing into the cavity of the drum. When the tube and cavity are free, the air strikes with an audible shock against the membrane of the tympanum. When the shock is over, or is slight, a blowing or rustling in the ear of the patient is heard, caused by the streaming of the air." All variations from this sound are morbid, and furnish more or less distinct indications of diseased changes in the organ. If the air-douche does not penetrate to the *membrana tympani*, Dr. Kramer advises catgut bougies to be used for opening the passage in the tube.

17. *A. Inflammation of the mucous membrane of the Eustachian tube* occasions modified or different results, according to the intensity of the morbid action and the degree in which adjoining parts participate in the disease. — *a. Catarrhal inflammation*, or irritation of the tube, with accumulation of mucus obstructing it, is a not infrequent attendant upon catarrhal complaints, upon inflammations of the throat or fauces, and upon eruptive fevers; the deafness sometimes accompanying these diseases, arising from this affection of the tube. It is most common in moist, cold localities and climates, near the sea coast, and in foggy weather.—The *Treatment* should be directed to the removal of the primary disorder, especially the affection of the throat. If the deafness still continue, astringent gargles containing the sub-borate of soda, or the nitrate of potash, or the hydrochlorate of ammonia, or gargles with the decoction and tincture of bark and muriatic acid, or the internal use of iodine, may be of service. Aqueous injections into the guttural orifice of the Eustachian tube have been advised by Saissy, Itard, and others; but Deleau and Kramer prefer the air-douche just described, notwithstanding the good effects of these.

18. *b. Deafness from inflammation of the mucous membrane of the tube* may proceed from disease of the throat, or of the proper membrane of the drum; and be complicated with either, or with both these diseases. In the case of its connection with lesion in the cavity of the tympanum, it is either associated with, or has followed, acute *otitis* or *otorrhœa*. But when the inflammation is confined to the guttural part of the canal, deafness is neither great, nor attended by pain in the interior of the ear. The patient hears well at times, but only momentarily. He hears his own voice even worse than that of others; and occasionally has a crackling, gurgling, or detonating sensation in the throat leading to the ear. The diagnosis is still more to be depended upon, if pain or inflammation exists in the throat or fauces, and if the former be increased on gaping or mastication. The chronic states of this disease of the tube are generally connected with syphilis, or with the scrofulous diathesis.

19. *c.* The *Treatment* of the more acute states of inflammation of the tube should be entirely antiphlogistic. Local vascular depletions; active purgatives, especially calomel with antimony; cooling and detergent gargles, particularly those with the sub-borate of soda, or nitre, or hydrochlorate of ammonia; external derivatives, or the warm or vapour bath, and diaphoretics, are generally required. After vascular depletion, an emetic is sometimes of service; but, as this disease most frequently is consequent upon, or complicated with, an affection of the throat or ear, or occurs in the course of exanthematous fevers, the treatment of it must necessarily depend very much upon the nature and state of the primary or associated malady. When the disease of the tube is chronic, or consequent upon venereal affections of the throat, mercurials, especially the *bichloride of mercury*, gargles containing this substance, or the internal use of the *iodide of mercury*, should be resorted to. In the scrofulous diathesis, the preparations of *iodine* may be tried. In protracted or severe cases, especially when connected with ulceration in the throat, or syphilis or scrofula, treatment is seldom successful, as they have very frequently gone on to the states next to be noticed.

20. *d.* When the inflammation, either from its protracted continuance, or from its extension to the connecting submucous cellular tissue of the tube, gives rise to *thickening of the mucous membrane*, or to *ulceration*, more or less *complete occlusion*, or *stricture*, or even *obliteration of the canal*, may result, especially when an ulcer is seated near the orifice of the tube, and afterwards cicatrises, as in cases of malignant angina, or of venereal ulceration of the throat. It is important to distinguish these lesions from those states of disease which admit of satisfactory treatment. This is to be done chiefly by ascertaining the history of the case: — If the deafness have followed severe affections of the throat, especially that occurring in connection with malignant eruptive diseases, with syphilis, or with scrofula; — if it have continued long, been constant and uninterrupted; — and if it have followed severe *otitis* or purulent *otorrhœa* (see art. Ear, § 10. 18.),—it may be inferred that one or other of the lesions just specified exists. If there be any doubt entertained, recourse to the means of exploration advised by Itard, namely, by forcing water into the tube; or to that employed by Deleau and Kramer, and described above (§ 16.), will establish the diagnosis.

21. Perforation of the membrane of the tympanum has been resorted to by Itard in cases of this kind; but with very equivocal success. Dr. Kramer states that he has found them incurable; and that this operation has been of no use in them, as the mucous membrane of the cavity of the tympanum is also diseased. The introduction of catgut bougies into the Eustachian tube has not been productive of any permanent benefit. If obliteration of the canal be complete, the cavity of the drum is always involved in the disease; and, *à fortiori*, perforation of the membrana tympani, advised by some writers, can be of no avail.

22. *e. Deafness may depend upon the occlusion of the Eustachian tube by tumours pressing upon its guttural extremity.* — Enlarged tonsils are the most common cause of this form of deafness; but polypous or fungous excrescences, and enlarged parotids, also, not infrequently produce it. In either case, the diagnosis is very easy, and the indications of cure sufficiently manifest. Polypi must be removed by excision or ligature whenever either can be performed. When the tonsils are enlarged, scarifications, astringent and detergent gargles, stomachic purgatives and tonics, the preparations of iodine, and the other means of cure directed for *enlargement of the* Tonsils (see the article), should be prescribed. If the tonsils contain matter, then puncture or incision of them ought not to be delayed. Enlarged parotids, if the affection be chronic, may be treated with iodine, &c.

23. *B. Inflammation of the cavity of the Tympanum.* — The inflammation may affect only the mucous membrane lining this cavity; or it may extend to the submucous cellular tissue, and even to the periosteum. It is generally either acute or chronic; and, in either case, is a severe and often dangerous disease. The symptoms, consequent lesions, and the treatment of this dis-

ease in its various forms, are fully described in the article Ear (see § 14. *et seq.*). As deafness resulting from *purulent otorrhœa*, with perforation of the membrane of the tympanum, or from *disjunction or loss of the small bones of the ear*, or from *caries of the osseous structure*, belong to the more chronic states of *otitis*, and is discussed in the article just referred to (art. Ear, § 19. *et seq.*, and 28. *et seq.*), it is unnecessary to recur to the subject at this place.

24. *C. Deafness may arise from extravasation of blood in the cavity of the drum.* — This lesion is usually the result of external injury, of violent attacks of sneezing, or of constriction of the neck; but it is chiefly caused by the first of these. In cases of this kind, Sir A. Cooper advised perforation of the membrane; but the extravasated fluid will either pass off by the Eustachian tube, or be absorbed. Moreover, the deafness and other unfavourable symptoms existing in these cases, are not so much dependent upon the extravasation in the cavity of the ear, as upon the injury other parts of the organ, or even the brain and its membranes, may have sustained. When, however, blood is effused in the drum, inflammatory action not infrequently supervenes.

25. III. Deafness from Affections of the Auditory Nerves. — *Nervous Deafness.* — We can seldom arrive at just conclusions respecting deafness from this cause derived from direct phenomena. We can infer it only from the absence of those deviations from the healthy state that have already passed under consideration. When, in connection with the absence of these lesions, ascertained by a minute examination, and by having recourse to the air-douche, there are indications of disease within the cranium, or of some other malady with which the organ of hearing may be presumed to sympathise, then the existence of deafness from an affection of the auditory nerves may be considered as probable. In such cases, there is impaired or lost hearing, without any organic deviation in the ear; the lesion being either in the nerves, in their expansions in the labyrinth, or in their course thither, or in the brain at or near their origins. It is always difficult, frequently impossible, to determine the situation of the lesion; and still more so to ascertain whether the lesion consist of simply impaired or lost function of the nerves, or of interrupted action, owing to extraneous influences or morbid productions in their vicinity. In all cases, however, the absence of organic change in the ear itself should be previously made out. Dr. Kramer states that most writers on the diseases of the ear — that Saunders, Swan, Lentin, Beck, Vering, J. Frank, and Saissy, have been incapable of determining this preliminary part of the investigation; that Curtis, Stevenson, and Wright are still worse authorities; and that Itard and Deleau are alone deserving of any confidence. Having consulted with M. Itard, and frequently referred to his writings, I can bear testimony to his science and candour, and to the great value of his contributions to this department of medical knowledge.

26. Dr. Kramer, with much of the spirit of the craft, but also with the science of the physician, severely criticises the writings of his contemporaries; rejects the distinctions of Itard, which, however, appear to me more scientific and correct than his own; and proposes a novel division of nervous deafness, and a new mode of treatment. He divides it into two forms, — the one attended by excitement or erethism — the other by torpor. Noise in the ears is always present in the former, but never in the latter. This symptom is often, however, attendant on very different diseases of the ear, but in a very indeterminate and inconstant manner. To determine, therefore, whether deafness with noises in the ear proceeds from disease in the organ, or from nervous affection merely, minute investigation and the means of diagnosis already mentioned must be had recourse to. But these are also requisite in the torpid form of nervous deafness. Mr. Swan believes, that many cases, usually imputed to palsy of the auditory nerve, are occasioned by chronic thickening of the membrane lining the cavity of the tympanum, involving the small branches of nerves in this situation. This is not improbable; and, admitting it to obtain, Dr. Kramer's mode of diagnosis will not always succeed, nor determine the existence or absence of true nervous deafness. On this subject, the views of M. Itard are more pathological, and less empirical, than those of Dr. Kramer; and therefore, in the few observations I have still to offer, I shall chiefly follow him.

27. *A. Deafness may proceed from compression of the auditory nerve.* — In most instances, however, this source of the affection cannot be accurately determined. A tumour may be developed, or purulent formations, or extravasated blood, may exist, in the course, or in the vicinity, or near the origin, of the seventh pair of nerves, interrupting the passage of impressions made on the organ to the sensorium; but this condition often can be only surmised. Duverney and Sandifort found these nerves pressed upon by tumours; and Severinus observed them surrounded by serum and effused blood. — If the tumour or morbid collection be considerable, then the extension of paralysis to the nerves of vision and of smell may favour the conjecture. Bonet mentions a case in which hearing and sight were lost, and on dissection a tumour was found pressing on the nerves of these senses. Thomann records a similar instance to this. Itard found, in a man who had lost the hearing in the left ear, small tumours lying on the corresponding side of the cerebellum, and nearly two ounces of a thick fluid in the ventricle of the same side. In cases adduced by Lieutaud, in several detailed by Lallemand, and in some seen by myself, an abscess had formed in the part of the brain adjoining the ear, and, by pressure or consequent disorganisation, had destroyed the functions of the auditory nerve. (See art. Ear, § 21. *et seq.*)

28. *a.* The *Symptoms* of deafness from compression of the nerve of hearing are — severe and nearly constant headach, vertigo, noise in the ears, impaired sight, and weakness of the mental faculties, especially of the memory. The progress of this affection is generally very slow, although the internal disease producing it is ultimately fatal. In several instances mentioned by Itard, it continued some years without materially affecting the general health. In two instances the above symptoms continued upwards of fifteen years. I also have known cases nearly as long protracted

as these. The case is most protracted when it proceeds from a tumour or morbid growth within the cranium.

29. *B. Deafness from palsy of the acoustic nerve.* — M. ITARD supposes that this nerve may be paralysed — (*a*) by a severe shock or commotion, — (*b*) by convulsions, — (*c*) by apoplexy, — (*d*) by fever, — and (*e*) from sympathy with some other organ. Without denying the possibility of these causes giving rise to palsy of the nerves of hearing, and even admitting that apoplexy or convulsions and fever will sometimes occasion it, yet the others may seem problematical. — *a*. It is probable that very loud noises, as a clap of thunder, or the explosions of artillery, may paralyse these nerves, especially as deafness from these and similar causes can be explained only after this manner, when symptoms of inflammation or of congestion of the ear, or of the brain, cannot be detected. M. ITARD believes, that the shock occasioned by falls in the lower parts of the body, or the counter-stroke occasioned in this and other ways, also may paralyse the auditory nerves; but this cause seems more doubtful than the preceding. When deafness has been occasioned by loud noises, hearing often returns spontaneously in a few days or weeks; but if the deafness persists for some months, it is rarely removed by treatment.

30. *b*. Deafness sometimes follows *convulsions*. — This is most frequently observed in children under four or five years of age. Many of the cases of deaf-dumbness originate in the convulsions occurring during the first dentition. But the deafness may not be the result of the convulsions; both the one and the other more probably being produced by some lesion at the origin of the acoustic nerves, or by effusion into the fourth ventricle, or by some change at the base of the brain, or about the medulla oblongata. When the loss of hearing is complicated with palsy of one side, or of one limb, the nature of the affection may be inferred; but when this is not the case, and when hearing in both ears is lost, the exact nature or seat of lesion can seldom be determined or even surmised. M. ITARD considers deafness occurring in this manner as quite incurable.

31. *c. Deafness from apoplexy* is a frequent occurrence; and may exist in one or both ears. — When hemiplegia has followed the apoplectic attack, the deafness is generally on the same side, and is then incurable; but when the patient is not far advanced in years, and when there has been no consecutive palsy, the affection of hearing may be somewhat ameliorated by the sole efforts of nature, or by the means about to be mentioned; but more frequently, especially in old persons, no advantage accrues to the hearing from treatment. — When deafness occurs early in *typhoid* and *infectious fevers*, it frequently continues after recovery from them. If a judicious application of remedies do not succeed in a reasonable time, and if the affection have been of long continuance, hearing is very rarely recovered.

32. *Treatment.* — When the deafness following these diseases is incomplete, and occurs in young persons, then blisters applied behind the ears, or moxas in the same situation; the vapour of æther, or of camphor; the internal use of stimulants, when there is no tendency to cerebral plethora; and the use of stomachic purgatives and alteratives, to promote the secreting and excreting functions, may be resorted to; but recovery of hearing in these cases may proceed as much from spontaneous changes in the circulation within the head, and in the state of nervous power, as from the remedies prescribed. (See also § 37.)

33. *d. Deafness is sometimes symptomatic of, or associated with, disorders of the digestive organs.* — In these cases, the affection is generally slight; but it is sometimes very considerable and difficult of removal. Impaired and disordered digestion, deranged biliary secretion and excretion, a foul or loaded tongue, tumid abdomen, a morbid state of the evacuations, and an unhealthy aspect of the countenance and of the general surface, generally characterise this form of deafness. — The *Treatment* consists chiefly in the exhibition of emetics, followed by stomachic purgatives, and in attention to diet and regimen. The purgatives should be often repeated, and sometimes even the emetics ought to be given from time to time. After the secretions and excretions have somewhat improved, tonics and deobstruents, and the preparations of iron, may be prescribed; and be aided by blisters, or moxas applied behind the ears. — The disorder of the digestive organs associated with deafness is sometimes also connected with *difficult dentition*, as justly remarked by NUCK, HESSE, and ITARD; and occasionally the impaired digestive, assimilating and excreting functions, of which deafness is symptomatic, gives also rise to the production of *intestinal worms*. In these circumstances, the indications of cure are manifest. (See DENTITION — *Difficult*; and WORMS — *Intestinal*.)

34. *e. Idiopathic paralysis of the acoustic nerves.* — This affection has been defined by ITARD to be a want of excitability in these nerves — a loss of their sensibility, independently of the circumstances or causes already passed in review. Its existence has been unjustly doubted by Dr. KRAMER. M. ITARD believes, however, that it may be congenital, or supervene at any period of life; but that it most frequently occurs after forty. It is often accompanied with headach, noise in the ears, and mental inaction. Numbness, or want of sensation in the external ear, is sometimes present. M. ITARD has seen the organic sensibility of this part entirely lost in two instances. In old persons, this symptom is often observed in slighter degrees, and is attended by dryness of the meatus. This variety of deafness is generally ameliorated by warm or mild weather, and by loud noises; but, as soon as these cease, the affection returns to its former state. — It is *caused*, as well as aggravated, by mental exertion and fatigue; by masturbation, venereal excesses, and other depressants; by exposure to cold, currents of air, and humidity; and by the depressing passions. Its accession is imperceptible, and its progress very slow. Sometimes it continues long stationary; but it is little influenced by treatment. If the patient, however, be not far advanced in life, some advantage may be derived from blisters applied behind the ears, or from moxas, rubefacients, or stimulants, around the organ, and repeated from time to time; from the vapour of æther, or of camphor, conveyed into the meatus, or into the Eustachian tube; from tonics, with serpentaria, or arnica;

and from the preparations of iron. Electricity and galvanism have been employed in this variety, but with little or no permanent benefit.

35. *f.* Deafness, in its more complete states, may also proceed from *organic changes in the acoustic nerves.* SYLVIUS found them, on dissection, remarkably atrophied; a state probably consequent upon prolonged inaction. ACKERMANN observed them indurated; and MORGAGNI states that, in one case, they were entirely wanting.

36. *C. Deafness from Plethora.* — *a.* Congestion of the vessels of the head or of the ear is not infrequently productive of deafness; and this congestion may either be purely local, or connected with a state of general plethora. In cases of this kind, the patient complains of headach, vertigo, throbbing noises in the ears or head, or momentary inconsciousness; which are increased by warmth, by a stimulating regimen, and the horizontal position. This form of affection is most common early in life, and again at middle age, or soon after; and especially in those who are subject to hæmorrhoids unattended by discharge, and in females who have experienced an interruption of the catamenia, or in whom this evacuation has ceased. The strictly local state of the affection may follow suppressed evacuations of various kinds, or repelled eruptions, or even retrocedent gout; and modifications of it are occasionally met with in connection with secondary syphilis, and with herpetic or other chronic eruptions.

37. *b.* The *Treatment* should in great measure depend upon the existence of local plethora or congestion only, or upon this state being associated with general plethora. The pathologist will generally decide correctly in these cases: but when the affection has followed the disappearance of accustomed sanguineous or other discharges or evacuations, spontaneous or artificial; and when the pulse, habit of body, and temperament, indicate vascular fulness; then general bloodletting, repeated according to circumstances, local depletions, purgatives, and external derivatives, low diet, and regular exercise, will generally restore the hearing, if they be decidedly prescribed, and rigorously pursued. Deafness, however, from local plethora, and especially from congestion of the vessels of the organ, is not so easily remedied; and, when remedied, is liable to return. Local depletions, either from the vicinity of the organ, or from the anus, when there is a tendency to hæmorrhoids; blisters applied on the nape, and kept long open, or preferably issues or setons; deobstruent purgatives or aperients, regularly and long persisted in; the warm or vapour bath; and other means calculated to promote the cutaneous functions, and prevent them from being interrupted, will be most serviceable for this form of the affection. If it have followed the suppression or disappearance of some eruption, discharge, or external affection, derivatives to the extremities, &c., sinapisms, blisters, &c., should be resorted to. If it have occurred in connection with secondary syphilis, a mercurial course will remove it, unless organic lesion of the Eustachian tube, or in the cavity of the tympanum, &c., have taken place. When it is associated with herpetic, or other chronic eruptions on the skin, the same internal and external means which succeed in removing these, will also generally improve the hearing; especially alteratives, purgatives, diaphoretics, sulphureous, fumigating, and other medicated baths, and strict attention to diet, and to appropriate means for improving the digestive, the assimilating, and the excreting functions.

38. IV. DEAFNESS AND DUMBNESS most commonly proceed from acute or chronic *otitis*, in early infancy, giving rise to organic changes in the delicate and complex structure of the ear, especially in the labyrinth, and in the acoustic nerves; or from diseased changes near the origin, or in the course, of these nerves. — When deafness is *congenital*, one or other of these lesions may be inferred to have taken place in the fœtus; or the organ, or nerves of hearing, may be considered as having been imperfectly developed in some of their parts. Deafness and dumbness are very seldom remedied, and never if the deafness has been congenital. If the affection has arisen in infancy from disease of the ear, then the treatment may be carefully directed to the removal of the morbid conditions which that disease may be presumed to have occasioned; but the utmost attention must be paid to the history of the case, to the existing state of the organ and of the constitution, and especially to the phenomena connected with the brain and digestive organs. Cases of this kind are rarely treated with success; but, for this very reason, they should be placed under the care of a scientific medical practitioner, and be treated according to general principles, directed to the particular lesions of the organ, and to the pathological states of the system. That these cases ought not to be despaired of, is proved by the instances of success detailed by M. ITARD, in an instructive chapter on the subject.

39. V. OF CERTAIN REMEDIES RECOMMENDED FOR IMPAIRED OR LOST HEARING. — With a desire of restoring the affections of the ear to the care of the regular practitioner, from whom the pretensions and advertising assiduities of empirics have almost entirely removed them, I shall next take a brief survey of the principal remedies employed in the treatment of these affections. And here I may remark, that none but well educated medical men, pursuing other branches of practice, should undertake the management of these disorders; for they, only, are capable of ascertaining the various pathological conditions of which deafness is either an immediate, or a remote and indirect, consequence, and of appropriately prescribing means of cure — of employing these means without risk of injury to the function, or to the organ, or even to the brain, with which the organ is so intimately connected.

40. *A. Constitutional Means.* — *a. Vascular depletions*, general or local, are necessary when inflammatory action, or general or local plethora, is present. In other circumstances they are inadmissible. — *b. Purgatives* are required in similar states; and when deafness is associated with disorder of any of the digestive organs, and with costiveness. They were much praised by DIEMERBROECK, HOFFMANN, and FABER. — They are injurious in purely nervous deafness, unless conjoined with stomachics and tonics. — *c. Emetics* have been recommended by STOLL, LAVAUD, and KENNEDY; and are sometimes of service when the hearing is impaired by inflam-

mation of the ear, or by collections of mucus in the guttural extremity of the Eustachian tube, or when the affection is connected with deficient action of the biliary apparatus. In nervous deafness, they are useless, and, when congestion of the brain is present, they may be injurious. — *d. Tonics* and *stimulants*, especially the preparations of cinchona, of cascarilla, of iron, of serpentaria, of arnica, of camphor, of ammonia, the æthers, &c., have been very generally resorted to in nervous deafness, and sometimes with benefit, when judiciously employed. — *e. Alteratives* and *deobstruents*, especially *mercurials* and *iodine*, or a combination of them, may be severally prescribed when the deafness is dependent upon secondary syphilis, or upon constitutional vice, or is connected with chronic cutaneous eruptions. They may also be tried when thickening of the membranes of the ear, or of the Eustachian tube, or obstructions of the latter by mucus, are supposed to exist. — *f. Salivation* was recommended by Desault and Ettmüller, but is requisite only when the affection proceeds from venereal ulceration in the vicinity of the organ. — *g.* The preparations of *squills* internally have been advised by Lange, when the Eustachian tube is obstructed by mucus; and a course of *dulcamara* by Carrère, when deafness is associated with herpetic eruptions. *Sulphur* and the balsam of sulphur may be prescribed, as directed by Ruland, in these or similar circumstances.

41. *B. Of Local Remedies.* — *a.* Of these the most vaunted are *electricity*, *galvanism*, and *mineral magnetism* — but chiefly by those who are adepts in these departments of quackery. The inutility of, and even occasional risk from, these means have been shown by Haller, De Haen, Zetzel, Freese, and Treviranus. Dr. Kramer has examined the proofs as to the efficacy of *electricity* in deafness furnished by the most respectable of those who have written upon the subject; and has shown that not one case can be said to have been cured, although many have been made worse by it. The opinions of Itard and Deleau nearly coincide with those of Dr. Kramer. Many cases have been published as cures by *galvanism* and *mineral magnetism*; but the improvement, said to have occurred, has continued only as long as the excitement occasioned by the employment of these agents. In most cases, however, no benefit has been derived from them, or it has been apparent only, or has existed merely in the patient's imagination. In two or three instances, patients have conceived their hearing to have been somewhat improved by galvanism; but I have observed, that this sense has nevertheless become more and more impaired.

42. *b. Moxas* have been praised by Paroisse, Loder, and Itard. Dr. Kramer is not favourable to them; but the testimony of a person who has a favourite remedy of his own, and finds fault with nearly all other means, should be received with reservation. M. Itard, whose experience and opinion are equal to those of Dr. Kramer, are in favour of them, in the cases in which they have been prescribed above. — *c. Issues* and *setons* have been employed by Zacutus Lusitanus, Ettmüller, Itard, and others, as derivative means. They should be inserted in the nape, or in the arm, in those states of the affection for which they have been already recommended. They will often prove inefficacious, or even injurious, if resorted to inappropriately; and especially in cases of idiopathic palsy of the acoustic nerves; or in old, enfeebled persons; or when the deafness has been caused by exhausting or depressing causes. — *d. Blisters*, applied behind and below the ears, and often repeated, or kept open, have been praised by Riedlin, Lavaud, Stoerck, Wendt, Itard, and others. Dr. Kramer considers that they, as well as the *tartar emetic ointment*, are indicated only in circumscribed inflammation of the auditory passage and membrana tympani. He prefers the ointment, which he rubs below the mastoid process, to avoid injuring this part. These means, however, admit of a more general application than he has allowed.

43. *C.* — *a. Masticatories* were prescribed in deafness by Wepfer, Diemerbroeck, Stahl, and Morgagni; but they are now entirely neglected. Several states, however, of this affection admit of a trial being safely given to them. — *b. Gargles* are amongst the most useful means that can be resorted to in those states of the affection which originate in acute or chronic disease of the throat. And when it is considered how very often inflammations of the ear, and deafness, are caused by lesions of the Eustachian tube, proceeding from the throat and posterior nares, especially during the various forms of cynanche, and in the course of eruptive fevers, the importance of these means cannot be overrated. These applications should be suited to the nature of the affection of the throat: in the more sthenic states of inflammatory action, they should be refrigerant, and contain the nitrate of potash, or hydrochlorate of ammonia, or borax; in the more asthenic forms of affection they may be astringent, tonic, and stimulant, and may also contain either of these, or some other, detergent substances.—When the occlusion of the guttural extremity of the Eustachian tube with mucus is suspected, these salts, especially the last, will be of service; and, when the deafness is in great measure nervous, the tincture of capsicum may be added to these, or to any other form of gargle that may be preferred. — In deafness connected with secondary syphilis (§ 20.), the bichlorate of mercury will be employed, in the form of gargle, with advantage.

44. *D. Drops* and *Injections*, especially those of a spirituous, irritating, or acrid nature, into the auditory passage, are justly considered by Itard and Kramer to be injurious. But various stimulating or rubefacient applications about or below the ear, as garlic, onions, rue, &c., have, according to Hoffmann, Müller, and others, sometimes been resorted to with advantage in nervous deafness. Dr. Turnbull recommends ointments with either *veratria*, *delphinea*, or *aconitine*, to be rubbed around the ear daily; or four or five drops of a spirituous solution of either of these (gr. ij—iv. to ℥ss. of spirit) to be dropped into the ear. — Of *perforation of the membrane* of the drum, notice has been already taken. Its want of utility, and the circumstance of its readily cicatrising, have been pointed out by Hufeland, Naase, Maunoir, Itard, and Kramer.— *Douches* of vapour or of water were formerly used in several affections of the ear.

Bartholin, Hoffmann, and Michaëlis, advised warm vapours, containing various stimulating substances, as camphor, æther, &c., to be directed into the meatus. These, however, require much caution and discrimination; but they may sometimes be of service, especially in catarrhal affections of the ear, and in idiopathic nervous deafness. Dr. Kramer undervalues these and other means, in order to enhance his own remedy (§ 45.).

45. *E. Injections into the Eustachian tube* were first recommended by Guizot; but Cleland, in 1731, first proposed them in a practicable mode, namely, by the nose; and Wathen long afterwards proved that a favourable result might be obtained from the practice. The injection of fluids into the tube was advised by Busson and others, to be performed by filling the mouth with the fluid; and, having firmly closed the lips and nose, by forcing it into the tube. — *Air* has also been directed to be forced into the tube, by Cleland and Sims, in the same way, in order to remove obstructions of it; and the smoke of tobacco has been similarly used, with the intention both of removing obstruction, and of exciting the organ, in nervous deafness, but with very equivocal results: I know one instance in which it proved decidedly injurious. Injections of medicated fluids, of vapour, and of air, into the Eustachian tube, by means of a suitable apparatus, have been severally resorted to by Itard, Deleau, and Kramer.—Besides injecting air as a means of diagnosis, Dr. Kramer throws into the tube, through a catheter introduced into it, the vapour of *acetous æther*, generated in a proper apparatus, at a summer temperature; but confines the practice to cases of nervous deafness characterised by torpor, or those unattended by noises in the ear. He also aids the local means by remedies intended to improve the constitution, and the digestive and other functions.

46. *F. Russian Vapour Baths* have been much recommended in deafness, especially when it has been supposed to originate in exposure to cold; and *warm*, or *fumigating*, or *sulphur baths*, have likewise been employed in these and other circumstances of the affection. They may all prove injurious in cases connected with congestion in the head or ears, or with general plethora. They are most serviceable when constitutional complaints—especially chronic cutaneous eruptions, or an obstinately harsh and unperspirable state of the general surface — are associated with the deafness; this latter probably depending in part upon a somewhat similar state of the ears to that of the skin and general system. In these cases they should be cautiously employed, vascular determinations to the head or to the ears having been previously removed, and morbid secretions and excretions freely evacuated.

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HEART AND PERICARDIUM — DISEASES OF THE.

— Syn. Καρδία, Χέαρ, Χῆρ, Gr. *Cor*, Lat. *Das Herz*, Germ. *Cœur*, Fr. *Cuore*, Ital. Περικάρδιον, Gr. *Pericardium* (from περι, around, and καρδία, the heart). *Péricarde*, Fr. *Der Hertzbeutet*, Germ. *Pericardio*, Ital.

1. I. Introductory Remarks.—The progress that has been made in the knowledge of the diseases of the heart, may be dated from the appearance of the writings of Hartenfels, Bonet, Vieusseux, Lancisi, and Barbeyrac, towards the close of the seventeenth, and at the commencement of the eighteenth, century. Lancisi first directed attention to lesions of the valves, and to hypertrophy, of the heart, as causes of sudden death. Morgagni, Senac, Meckel, Juncker, and Spaventi, further advanced our knowledge of these diseases; but, from the middle of the last century, when the work of the last-named writer appeared, until the beginning of the present, when Corvisart wrote, this department of pathology was completely neglected. With Corvisart, the recent progress that has been made in it may be said to have commenced. His work was soon followed by that of A. Burns, by the engravings of Baillie, and by the fragment of Farre, in this country; and by the works of I. Warren, in North America; of Testa, in Italy; of Kreysig, in Germany; and of Bertin and Laennec, in France. Still more recently, the publications of Louis, Andral, Williams, Elliotson, Hope, Stokes, Watson, Latham, Corrigan, Bouillaud, and the con-

tributions of many others, have further enriched this department of our science.

2. i. *Of certain Topics relative to the Structure and Actions of the Heart in Health,* &c. — *a.* The *layers of muscular fibres*, and their various and tortuous directions, in the different compartments of the heart, require not particular notice here. According to M. Gerdy, these layers amount to six in the left ventricle, and only to three in the right; in both auricles, there are two in each. The muscular tissue of the right auricle is less abundant than that of the left, and leaves minute intervals between its fibres, allowing the external and internal membranes to come in almost immediate contact. To this circumstance M. Bouillaud imputes the frequent association of inflammations of these membranes. The muscular fibres of the heart are more distinct in the fœtus than in the adult; this organ only participates in the general paleness of muscles at that epoch, although it is deeper coloured than they. It is also entirely without fat at this period. In corpulent persons, the external layers of muscular fibres, especially at the base, are covered with fat; which sometimes presents a watery or gelatinous appearance in the cachectic or leucophlegmatic. In old age, the texture of the heart becomes soft and flaccid, and the parietes of the cavities thin. The cavities themselves enlarge, especially the right; and the surface of the organ is charged with fat. —The *chordæ tendineæ*, the whitish *zones* at the base of the valves forming the contour of the orifices, and the *interior of the valves* themselves, are principally formed of fibrous or albugineous tissue, which often becomes, especially in the latter situation, the seat of serious lesions, particularly in persons advanced in life.

3. *b.* The *internal surfaces* of the heart, as well as the parts just named, are covered by a transparent, pellucid, and whitish membrane, resembling the most attenuated serous membranes. It is more delicate in the right than in the left cavities; and the least so in the auriculo-ventricular and arterial orifices. It is readily stained by the colouring matter of the blood, owing to imbibition during certain states of this fluid. It is perfectly smooth and polished; but, in the situation of the orifices, where it is thickest, it often becomes rough or uneven, from chronic inflammation, which most frequently occurs in these parts, and in the valves. It is connected to the fibrous and muscular tissues by a fine cellular substance, which often is thickened or otherwise altered by disease.—This membrane has been appropriately called the *Endocardium* (from ἔνδον, within, and καρδία, the heart) by M. Bouillaud. — It adheres so firmly to the adjoining tissues, that it can be detached only in small pieces; but, in certain diseases, it can be removed in large shreds. At the base of the valves, where the two layers of this membrane separate to receive the tendinous rings bordering the orifices, the *endocardium* and *pericardium* are nearly in contact with each other, or are connected merely by a fine layer of cellular tissue. This state of structure, and its connection with the inclosed fibrous tissue, explain both the frequent coexistence of internal and external inflammation of the heart, and the intimate connection often existing between these inflammations and rheumatism. — *c.* Of the *pericardium* it is unnecessary to say more than that it is a serous membrane, forming, as in all other situations, a shut cavity, reflected over the heart, and origin of the large vessels, and over the fibrous bag inclosing this organ. Its free surface is polished, smooth, and bedewed by an exhalation preventing friction, and the production of any sound; but, when it is diseased, morbid sounds, as well as other phenomena, result.

4. *d.* The *nerves* of the heart have been a subject of interest with pathologists. They are derived chiefly from the ganglia of the great sympathetic, a few only coming from the pneumagastric; but these latter seem rather to inosculate or communicate with the plexuses of the former, than to directly supply the texture of the organ. The cardiac ganglion seems more particularly to preside over the actions of the heart, or to re-enforce with additional energy whatever it may receive from other sources, especially from the centre of the ganglial system, and the other ganglia in the neck and chest. These nerves supply the substance of the heart in two ways:— 1st. There are numerous branches which proceed from plexuses directly to the muscular texture, and which, dipping between the fibres, give off minute fibrillæ to the muscular fibres next to them in their descent into the substance of the heart; — 2d. A large portion of the cardiac nerves form a reticulum around the coronary arteries. A part of these follow the arteries to their distributions; but before these arteries are ramified minutely, a part of the nerves surrounding them is detached to adjoining tissues, so that *all* the nerves reticulated around the coronary arteries do not accompany them to their ultimate distributions or terminations.

5. *A. The Actions of the Heart* may reasonably be referred chiefly to the influence which the ganglial nervous system bestows on the muscular structure of the organ. — Haller attributed them to *irritability*, or a peculiar power inherent in the muscular fibres themselves. But I have contended in several publications, since 1820, that the ganglial system is the source of irritability; and the same view has been more recently adopted, and ably supported, by Dr. Fletcher. The experiments of Willis, Home, W. Philip, Clift, Brachet, and others, show, that the actions of the heart are independent of the cerebro-spinal nervous power, although they are influenced by it. In experiments, which I performed, in 1818, on several species of fish, the heart continued to contract, not only after the destruction of the cerebro-spinal axis, but even for some time after it was removed from the body. Cases, also, have been observed by Lallemand, Lawrence, and others, of the absence of both the brain and the spinal chord, and yet the circulation continued for a considerable time after birth. An instance very nearly of this kind has very recently been observed by my colleague Dr. Sweatman. Humboldt found that the contractions of the heart, even after the removal of it from the chest, were more frequent and forcible, upon the application of the galvanic current to one of the cardiac nerves; and Home and Weinhold obtained nearly similar results from their experiments. In 1820, I repeated these experiments, and the phenomena were the

same as observed by these physiologists. The more recent researches of M. Brachet show the justness of my views as to the dependence of the heart's action upon the ganglial system, and which were published twelve years before the appearance of his work upon this system. In my publications on this subject, it has been further contended, that *irritability* does not exist as an independent principle, but as one of the vital manifestations of this system, exerted through the medium of muscular or fibrous tissues.

6. *B.* Such, therefore, being the source of the heart's action, the *chief seat of action* requires some notice.—I believe that too much importance has been attached to the auricles, in estimating the motions of the heart; and that the contractile force of these compartments is much less than is supposed. From some experiments I performed about twenty years ago, I concluded that the actions of the heart should be referred chiefly to the ventricles, and agreed with Hamberger in allowing them a dilating power; but considered that Dr. Carson pushed this opinion too far. I further observed, that if the dilatation of the ventricles were a result of a relaxation of their parietes merely, the cavities would not be so quickly and perfectly filled by the mechanical pressure of the blood as they are; and dilatation would be only the consequence of this pressure, and be proportionate to it. But such is not the case; for, on close observation, the dilatation always appears as the cause of the flow of blood. The opinion of M. Bouillaud nearly agrees with the above inferences, published by me in 1824. He, however, considers the injecting powers of the auricles to contribute to the dilatation of the ventricles, and attaches too much importance to the elasticity of their muscular parietes in aiding this action. If the contractions of the auricles were as energetic as commonly believed, a valvular apparatus would have existed between them and the roots of the large veins. The actions of the ventricles should, therefore, be viewed in the double light of *energetic contraction*, and *active dilatation*; by means of the former, the blood is propelled along the arteries, and, by aid of the latter, it is drawn into the ventricles, as well as into the auricles, a current from the smaller veins being thus kept up towards the heart. (See *Notes and Appendix to* M. Richerand's *Elements of Physiology, &c.*, by the Author.)

7. ii. *Of the Weight and Dimensions of the Heart in Health and Disease.*—*A.* It is obvious that no precise idea can be formed as to atrophy and enlargement of this organ, without having previously determined the dimensions and weight of it in health. This M. Bouillaud has endeavoured to ascertain. The following results are abstracts of his researches, and are given in the French weights and measures. He considers that the common opinion of the closed hand being the size of the heart of the same person is very nearly the truth; and that the opinions of Cruveilhier and Lobstein as to the weight and size of the healthy organ are neither precise nor correct. In fourteen cases—(*a*) The *heart's medium weight* was 8 oz., 3 dr. (9 oz. 4 dr.), the greatest being 11 oz., and the least 6 oz. 2 dr., but its weight varies with the size of the person: it also is less in females than in males. The heart cannot be said to have arrived at its full development until 24 or 25 years of age.—(*b*) The medium *circumference of the heart*, at the base of the ventricles, was 8 inches 9 lines, the least being 8 inches, the greatest being 10 inches 6 lines.—(*c*) The *medium thickness of the walls of the left ventricle* was 6½ lines, the maximum being 8, and the minimum 5 lines. The *medium thickness of the parietes of the right ventricle* was 2⅗ lines, the maximum being 3½, the minimum 1½ line. The *interventricular partition* was 7 lines in thickness. The *medium thickness of the parietes of the left auricle* was 1½ line; that of the *right*, 1 line.—(*d*) M. Bouillaud confirms the statement of Legallois, that the *medium capacity* of the right ventricle is somewhat greater than that of the left; and that of the right auricle greater than that of the left.—(*e*) The *circumference of the left auriculo-ventricular orifice* is about 3 inches 6 lines; that of the *right*, 3 inches 10 lines; that of the *ventriculo-aortic orifice*, 2 inches 5½ lines; and that of the *ventriculo-pulmonary orifice*, 2 inches 7¾ lines.

8. *B.* Of seven cases of *atrophy of the heart*—(*a*) The *medium weight* was 175 grammes (or scruples = 7 oz. 2 dr. Eng.); the maximum being 200, the minimum 135 grammes.—(*b*) The different compartments of the organ, in a state of atrophy, generally preserve their relative dimensions. Sometimes, however, the parietes of the ventricles retain their usual thickness, chiefly from contracting on themselves and diminishing their capacity. In atrophy, also, the mean weight of the organ may be much lessened, whilst the dimensions of the whole, or of certain compartments of it, may not be sensibly, or may be only slightly, diminished.

9. *C.* In *hypertrophy of the heart*—(*a*) The *mean weight* of thirteen cases was 473 grammes (scruples) 5 grains; the maximum being 688, the minimum 338 grammes.—(*b*) The *mean circumference* of the organ was 11 inches 10⅔ lines, the maximum being 12 inches, and the minimum 8 inches 10 lines.—(*c*) The *mean thickness* of the *left ventricle* was 10½ lines, the maximum being 1 inch 1 line, the minimum 7 lines.—(*d*) The *mean thickness* of the *right* was 3⅞ lines; the maximum being 4½, the minimum 3 lines. The mean thickness of the *left* and *right auricles* was 2⅙ lines, and 2¼ lines respectively,—that of the *interventricular partition* being 9¼ lines.—(*e*) The *capacity* of the left ventricle was generally more or less increased; that of the right was also increased in one third of the cases. In three instances the capacity of the ventricles was diminished.—(*f*) The *circumference* of the *left auriculo-ventricular orifice* was increased in three cases, in one of them to 4 inches 3 lines; that of the *right* was augmented in five instances, in one of which it reached 5 inches 9 lines; and that of the *ventriculo-pulmonary orifice* was increased also in five, and reached in one 3 inches 6 lines.

10. iii. *Of the Sounds of the Heart.*—In the article on Auscultation, I stated the received opinions as to the sounds of this organ, and remarked that the subject required further investigation. Since that time, several able inquirers have entered upon it, and may be said to have settled the question. Harvey and

HALLER described the contractions of the auricles as preceding those of the ventricles. This, the true view of the matter, was departed from by LAENNEC, who conceived that the contractions of the auricles followed those of the ventricles. The researches of TURNER, CORRIGAN, WILLIAMS, HOPE, and BOUILLAUD, have shown the inaccuracy of LAENNEC's opinion. Dr. WILLIAMS, especially, has assiduously investigated this subject; and, as his inferences have been upon the whole confirmed by the committees of the British Association, I shall follow him chiefly in the few remarks which remain to be made respecting it. — 1st. The contraction of the ventricles, following immediately that of the auricles, is accompanied by the *first* or *dull sound*. This *systole*, by straightening the anterior convexity of the ventricles, brings the apex of the heart into forcible contact with the ribs, and thus produces the *impulse* or shock. The systole, by throwing an additional quantity of blood into the arteries, causes the arterial pulse, which is synchronous with the systole in arteries near the heart; but, in those more distant, succeeds it at an interval occupied by the transmission of the wave through the blood along the elastic tubes from the heart. — 2d. The systole of the ventricles is immediately followed by the *diastole*, which is attended by the *second* or *short sound*. — 3d. There is afterwards an interval of *rest*, at the conclusion of which the auricles contract, and the series of motions is repeated as before. The points which here remain to be settled are — (*a*) the way in which the systole of the ventricles produces the first sound; and (*b*) how the diastole causes the second.

11. The *first sound* was ascribed, by Mr. CARLILE, to the rush of blood into the great arteries; by M. ROUANET and others, to the closing of the auriculo-ventricular valves; by Dr. HOPE, to the collision of the particles of fluid in the ventricles; and by Dr. WILLIAMS, to the muscular contraction itself. — The *second* or short sound was ascribed, by Dr. HOPE, to the impulse of the blood from the auricles refilling the ventricles; by CARSWELL, ROUANET, CARLILE, BOUILLAUD, and others, to the suction of the ventricles causing the elevation of the sigmoid valves, and to the reaction of the arterial columns of blood against these valves. The experiments performed by Dr. WILLIAMS, assisted by Dr. HOPE and several other able physiologists, in order to determine these points, proved, that the *first sound* is produced by the muscular contraction of the ventricles; and that the *second sound* is caused by the reaction of the arterial columns of blood tightening the semilunar valves at the diastoles of the ventricles. — Dr. WILLIAMS, Dr. HOPE, and M. BOUILLAUD, concur in considering the *impulse* or stroke of the heart to be effected by the apex alone; whilst the experiments of the Dublin Committee seem to show that the body of the ventricle is also concerned in producing it. The London Committee admit that the first sound is caused by muscular tension, but think that the impulse may be an accessory. In other respects they all tolerably agree.

12. iv. *The morbid Actions and Sounds of the Heart* have been very fully considered in the article AUSCULTATION (§ 25.). Little, therefore, remains to be noticed respecting them at this place, beyond a brief mention of the views of some writers of eminence that have appeared since that article was published. — *A.* As may be expected, *à priori*, the duration of the systole seems often to be prolonged by the difficulty experienced by the blood in passing through the morbid arterial orifices. Continued and violent palpitations, particularly in cases of hypertrophy, tend eventually, according to the observations of M. BOUILLAUD, to produce marked prominence of the præcordial region. I have remarked this, also, in cases of sub-acute and chronic pericarditis. In a case of pericarditis, complicated with rheumatism of the joints, in a child seven years of age, who was long under my care, this prominence and the palpitations were remarkable; but, after a time, these disappeared, and the lower half of the sternum, with the cartilages of the ribs, became drawn inwards, and towards the spine, to such an extent as to form a very remarkable cavity in the præcordial region. This occurrence was so singular, that I caused the patient to be shown to several of my colleagues at the Middlesex Hospital. It appeared to have arisen from adhesion of the pericardium to the heart, and from the subsequent atrophy of the latter.

13. *B.* The *intensity of the sounds*, as well as of the impulse of the heart, varies remarkably. — In some instances the sounds are feeble, and heard with difficulty; whilst in others they are heard at a distance of two or three feet. Although the impulse against the ribs does not produce either of the natural sounds, yet, in violent action of the heart, the more sudden and abrupt strokes cause a sound, constituting the termination of the first sound in these cases, and which seems nearer the ear, and more like a knock, than what is heard in the ordinary action of the heart. The sounds may assume a dry or hard character, which BOUILLAUD imputes, but I think incorrectly, to hypertrophy and rigidity of the mitral valve; or they may be large, hoarse, or rough, owing, as he thinks, to a fungoid or infiltrated condition of the valves, which are then soft and flaccid.—The saw sound sometimes has a peculiar *hissing* character, and at others a thick or *rough tone*; but all these are merely modifications of the bellows-sound, and are very commonly connected with narrowing of the orifices of the compartments. LAENNEC considered them to proceed from spasm, of the existence of which, however, we have no satisfactory proof. — A sound, which varies in tone from the *cooing* of a dove to the *chirping* of birds, or the *sibilous* noise of bronchitis, is more rarely heard: I have heard it only twice. It has also been noticed by M. BOUILLAUD, ROUANET, and, I believe, by Dr. WATSON. It seems connected with narrowing of the orifices. I heard it in a case of rheumatic pericarditis in a child. — The *bellows*, or *blowing sound*, M. BOUILLAUD asserts, has been heard in upwards of a hundred cases, where contraction of the orifices, with induration of the valves, was established by dissection; whilst M. PIORRY states, that his experience is at variance with this result. An able reviewer (*Brit. and For. Med. Rev.* No. ii. p. 451.) very justly remarks, that, although cases of well-marked contraction, with ossifications, &c., do present themselves, unaccom-

panied by any such abnormal sounds, such occurrences are extremely rare, and form only the exception, and not the rule, as M. Piorry would have them to do. It should also be kept it mind that the morbid sounds may be produced by a refluent, as well as by an onward, motion of the blood, as M. Filhos has contended.

14. M. Bouillaud considers that the *bellows sound* may proceed from — 1. Narrowing of the orifices, with induration of the valves ;—2. Smallness of the aortic orifice, although the valves are quite healthy ;—3. Polypous exudations, resulting from acute inflammation of the endocardium ; — 4. Irregularity or roughness of the surface of the valves, or vegetations, or calcareous incrustations on them ; — 5. Infiltration of the valves from inflammation ; — 6. Adhesions of the auriculo-ventricular valves to the adjacent parietes ; — 7. Dilatation of one or more of the heart's orifices, with consequent inefficiency of the valves ; — 8. Hypertrophy, with dilatation of the left ventricles, although unattended by narrowing of the orifices ; — 9. Chlorosis, anæmia, and nervous affections of the heart, in some instances ;—10. Extreme debility from hæmorrhage, or other depressing causes. It has been supposed that the bellows sound, which is not constant, or is only occasional, in the three last circumstances may arise from spasm. M. Bouillaud believes it to depend in these on a narrowing of the orifices, to adapt themselves to the diminished quantity of blood circulating through them. He further considers that all the above cases are reducible to one common principle, namely, increased friction produced in some of them by the direct, in others by the refluent, current of the blood ; but most frequently from the former cause. From this it is evident — and most experienced practitioners must have arrived at the same conclusions, from their own observations — that it is impossible to decide, from the bellows sound alone, in which of the orifices, if in any, the lesion is seated. The co-existence of this sound with the systole or diastole, and the situation in which it is loudest, may assist the observer, but still no accurate conclusion can be formed as to its precise cause. — When the *sawing* or *rasping sound* is heard, the alteration may be considered to partake more or less of an osseous nature.

15. *C.* The *sounds produced* occasionally *by the surfaces of the pericardium* in a state of disease, were overlooked by Laennec, and have only recently received attention. It is chiefly to Collin, Reynaud, Honoré, Stokes, Williams, Mayne, and Bouillaud that we are indebted for observations respecting them. M. Bouillaud divides these sounds into three varieties. — 1st, The *rubbing sound*, resembles that caused by rubbing together two pieces of silk, or of parchment. It is to be distinguished from a similar sound produced by the pleura, by its being double and synchronous with the heart's action. It is most obvious in the systole, and is diffused over a considerable surface. — 2d. The *creaking sound*, is altogether similar to the creaking of leather, or of shoes, or of a saddle. M. Bouillaud remarked it once ; M. Andral only once, and Dr. Williams in three cases. M. Collin and others have also heard it. I have met with it in two instances : one of them a boy, about ten years of age ; the other a young lady of about twenty, who, in 1833, came from Brompton to consult me. She had, several months previously, experienced an attack of acute pericarditis ; and, whilst describing her symptoms to me, she herself likened the morbid sound she heard in the præcordial region to the creaking of new shoes. I heard it distinctly with the unassisted ear. — 3d. The *scraping sound*, is such as may be expected to be produced by rubbing a rough and hard cartilaginous or osseous body against the pericardium. Its synchronism with the motions of the heart distinguishes it from similar morbid sounds originating in the pleura. M. Bouillaud states, that the two first sounds occur only in acute pericarditis. In the two instances I met with, there had existed the acute form of this disease ; but it had long before subsided, leaving after it organic lesion, or at most a chronic state of inflammation. The friction, or rubbing sound, in its faintest states, occurs in the early stages of acute pericarditis, and whilst the membrane is dry. The creaking or leathery sound seems to arise from thickening or condensation of the subserous and serous tissues of the pericardium, especially of the portion reflected over the heart ; and the formation of a dense and elastic false membrane, with, perhaps, more or less adhesion of the opposite surfaces. The scraping or grating sound is caused by lesions which occur only in the more protracted cases of chronic pericarditis. — When the bellows sound is heard in pericarditis, it does not necessarily depend upon this disease, but rather upon the coexistence of inflammatory action in the internal membrane of the heart, or the extension of it to the fibrous structure of the orifices or of the valves, and the consequent contraction or other lesions thereby occasioned.

16. v. *Percussion of the Cardiac Region* is best performed with the index finger of the unemployed hand as the medium, or plessimeter. In the healthy state, the extent of the dull sound generally varies from an inch and a half to two inches square, which answers precisely to the extent to which the heart is disengaged from the lungs. The extent of the dulness increases very much in hypertrophy of the organ with or without dilatation of the cavities, in simple dilatations, and in congestions of them occurring in various diseases. It is not unusual to find the dulness, in these circumstances, extending to five or six inches square. (See art. Auscultation.)

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II. A GENERAL VIEW OF DISEASES OF THE HEART.

— SYN. Καρδίας νόσοι, Gr.; *Cordis Morbi*, Lat.; *Herzkrankheiten*, Germ.; *Maladies du Cœur*, Fr.; *Malattie del Cuore*, Ital.; *Diseases of the Heart*, *Heart-Diseases*.

17. As the various maladies of the heart frequently proceed from the same causes, often are met with in similar states of complication or association, admit often of the same prognosis, and even frequently require the same modes of treatment, I shall, in order chiefly to prevent repetitions, take a general view of them before I proceed to consider their specific forms.

18. i. The *Causes of Diseases of the Heart* are even more diversified than was supposed by Corvisart and some other writers. — *A.* The *Predisposing Causes* are nearly the same as those concerned in producing inflammatory and nervous diseases in other organs; but the unceasing actions, and the intimate sympathies, of this viscus, not only increase the general predisposition, but also serve to impart a peculiar character to the effects more immediately produced on it by numerous physical agents and moral influences.— The irritable, nervous, and sanguineous temperaments; a plethoric habit of body; the rheumatic and gouty diathesis; depression of mind; and the puerperal states, favour more or less the occurrence of diseases of the heart. Lancisi, Albertini, Senac, Morgagni, Corvisart, Bouillaud, and others, have remarked an hereditary predisposition to these diseases, independently even of either of the diatheses just particularised. Besides these, susceptibility of the nervous system, whether original or acquired; and pre-existent disorder, especially debility in its various forms; impaired digestive, excreting, and assimilating powers; morbid states of the blood, affections of the lungs and liver, and irritations of the uterus and spinal chord, predispose more or less to these maladies.

19. *B.* The *Exciting Causes* may be arranged into — 1st. The Mechanical and Traumatic; — 2d. The Physical; — 3d. The Moral; — and, 4th. The Pathological. — *a.* Under the *first* of these may be arranged blows, falls, wounds, and external injuries, directly or mediately affecting the organ; compression of the ribs or sternum, or of the hypochondria, by resting against a desk, and by strait lacing; and over-distension of the stomach by food or drink. — *b.* Amongst the *physical causes*, may be enumerated — great muscular exertion, especially while the breath is retained; long journeys on foot, and fatigue; running against the wind, or ascending eminences or stairs; reading or speaking aloud, and singing, especially if long continued, or when empassioned; blowing wind instruments; straining at stool; advanced pregnancy; excessive venereal indulgences; the abuse of spirituous or fermented liquors; arsenical preparations in poisonous doses, or employed too long or in too large doses as a medicine; the injudicious use of other acrid substances; exposure to cold, or to cold and humidity conjoined, and to currents of cold air; wearing damp linen or clothes, or sleeping in damp beds or sheets; and drinking cold fluids, or eating ices when the body is perspiring. — *c.* The *moral causes* comprise all the depressing and exciting affections of mind, especially when excessive, but more particularly the former. Sudden shocks, fright, terror, violent fits of anger, anxiety, grief, sadness, nostalgia, amorous affections — all not merely affect the functions of the heart in a very remarkable manner, but sometimes also alter its structure.

20. *d.* The *pathological causes* are still more influential than the causes already enumerated; and act in different ways. — 1st. Some of them embarrass the actions of the heart, by impeding the functions of the diaphragm and lungs, as flatulent distension of the stomach or colon; enlargement of the liver, or of the spleen, and effusions of fluid in the large cavities. — 2d. Others obstruct the circulation through the lungs, and consequently cause congestion or distension of the heart's cavities, as asthma, hooping cough, pneumonia, bronchitis, convulsions, &c. — 3d. Certain pathological states extend to the heart or pericardium from other parts, owing either to proximity of situation, or to their structure being of the same kind as that of the parts previously affected. — Thus inflammation of the external or internal membrane, or other diseases, of the heart, appear in the course, or after the subsidence, of pneumonia, of pleuritis, of rheumatism, &c. — 4th. Some of these causes are connected with excessive vascular plethora, with or without a morbid condition of the circulating fluids, as the suppression of eruptions or discharges, and interrupted or impeded action of any of the principal assimilating and excreting organs. That the blood may become morbid, owing either to the imperfect assimilation and the injurious nature of the ingesta, or to the accumulation in it of the ultimate products and effete principles of assimilation requiring to be eliminated by the energetic action of the emunctories; and that this state of the blood may excite disease in some part of the heart's internal surface, seem more than probable. — The changes in the circulating fluids, moreover, taking place in the course of fevers, or in connection with the exanthemata, erysipelas, gout, &c., may also occasion disease of this organ; and it is not unreasonable to infer, that, when this connection is observed, as much is often owing to the morbid condition of the blood, as to that of the living solids. — 5th. In cases of suppression of gout or rheumatism, or the retropulsion of the exanthemata, and of other acute cutaneous eruptions, it may be admitted, that whilst the constitutional disturbance, upon which the local or external affection depends, remains unabated, the suppression of the latter will very probably be followed by some prominent affection, or localisation of morbid action, in an internal organ, especially if the powers of life are inadequate to throw it off upon some external part; and as, in these diseases, the circulating fluids are more or less altered, and the actions of the heart already much disturbed, one or other of the tissues or compartments of this organ will be quite as likely to become the seat of the superinduced

malady, as any other internal part; and even more so, as respects rheumatism, owing to the predisposition arising out of identity or similarity of structure. — 6th. One affection of the heart, functional or structural, may occasion another, or an additional lesion. Thus violent palpitations sometimes rupture a muscular column, or tendon, of the valves, or even the parietes of the heart itself; and narrowing of an orifice occasions dilatation of the cavity behind it, &c.

21. Whilst CORVISART and SCHINA have attached the greatest share of importance to moral causes in the production of cardiac diseases, and undervalued the influence of physical agents, M. BOUILLAUD has over-estimated the latter, at the expense of the former; and they, as well as all other writers, have either entirely overlooked, or have scarcely adverted to, several of the antecedent changes, or pathological states, to which I have imputed so much in the causation of these maladies.

22. ii. *Of the Seat and Anatomical Characters of Diseases of the Heart.* — *A.* It is extremely rare, as M. BOUILLAUD remarks, to find the heart altogether diseased: most commonly a compartment only, or a portion of it merely, or even one of the tissues constituting it, is affected. Sometimes one or more valves, or orifices, are primarily altered; and in other cases, either the internal or external membrane, or the muscular structure, is changed. In one instance, a cavity is dilated, and its walls thinned; in another, it is of natural capacity, but its parietes are remarkably thickened; and in others, the compartments individually present various lesions, as softening, hardening, &c.

23. *B.* The *intimate nature* of the heart's lesions is not always evident, even on the most minute examination. That they are frequently inflammatory, or of that kind usually so denominated, cannot admit of doubt; and that they still more frequently are the consequences of inflammation in some one or other of its grades, modified, however, by the tissue in which it is seated, by the state of vital power attending it, and by the condition of the circulating fluids, is not less true, although less manifest. than the former proposition. Inflammation affecting a serous surface gives rise to results varying with its intensity and with the state of the constitution, in respect both of organic nervous energy and of vascular tone. When the latter remain unimpaired, the production of coagulable lymph is a common result; but the lymph, being secreted in a fluid state, will often, when the internal membrane of the heart is inflamed, be washed into the current of the circulation before it can be coagulated, and no very manifest evidence of the disease may be detected after death, although it has existed in its most intense form, or even has been the cause of death. When the inflammatory action is co-existent with depressed vital power, and a morbid state of the blood, the fluid secreted by the inflamed surface is incapable of coagulating, and it readily mixes with, and contaminates, the vital current; the seat of disease presenting after death but little change, beyond dark discolouration, and softening. In respect both of the internal surface, and of the substance of the heart, lesion of the capillary action and tone, as well as of vital cohesion, may have existed during life, and yet escape detection after death; and certain of the changes sometimes observed — especially alterations of colour, fibrinous coagula attached to the valves, &c., and slight effusion into the pericardium — have either taken place shortly before, or at the period of, dissolution, or even soon after this issue.

24. Although most of the affections and lesions of the heart are to be imputed chiefly to inflammatory action and its consequences, varied by the conditions alluded to, yet they are not altogether of this nature, or do not always originate in this way. We have seen above (§ 5.), that this organ derives its energies chiefly from the ganglial nervous system; it must, therefore, follow that extreme depression or exhaustion of this system must be attended by a marked alteration of the functions of the heart: indeed, the evident imperfection of the actions of the latter is one of the principal indications we possess of the exhaustion of the former. And, if this alteration or imperfection of action continues long, or returns frequently, lesion of structure, especially dilatation, softening, thinning, atrophy, &c. of the parietes of one or more of the compartments of the organ, &c., must ultimately take place. Nor is this the only mischief; for, along with it, alteration of the circulating fluid often exists, — this latter still further impairing nervous or vital power, — and, in connection with both these pathological conditions, inflammatory action, or an altered state of vascular action constituting one of the morbid conditions usually so denominated, occasionally also takes place in the internal surface of the heart, or in some other of its constituent tissues, giving rise to the further changes already alluded to in general terms, and hereafter to be more particularly noticed.

25. iii. *The general Characters and Diagnosis of Diseases of the Heart,* naturally divide themselves into — 1st. The *Local Signs*; and, 2d. The *general Symptoms*, or sympathetic phenomena. The former have been generally termed *physical*; the latter, *physiological* and rational: but the one class should always be considered in connection with the other in the course of practice. — *A.* The *local signs* are ascertained by *auscultation*, *percussion*, *inspection*, and *palpitation*. Of the former of these means, sufficient notice has been taken. (See arts. AUSCULTATION, and CHEST.) — The latter requires equal care with the former; and the sensations communicated to the hand of the examiner, as well as those excited in the patient by the examination, should be attentively ascertained and estimated. The indications furnished by these means are diversified according to the nature of the diseases which furnish them; but they can be known only by listening to the extent, seat, and nature of the sounds given out by the organ, or elicited by percussion; by observing the form and motions of the præcordial and adjoining regions; by feeling the motions, tremors, or thrills, often existing in these situations; and by ascertaining the sensations of the patient upon pressing between the ribs, or on the præcordia, or upwards upon the diaphragm, and under the anterior margin of the left floating ribs.

26. *B.* The *general symptoms*, or sympathetic phenomena, are ascertained from attentive observation of the several related functions. — The very intimate relation of the heart to all the

principal viscera, but especially to the blood and circulating vessels, to the organic or ganglial nervous system, and to the respiratory organs, and the influence which these exert upon this organ, and which it exerts upon them, severally and conjointly, require to be kept in view. The manner, also, in which the brain, the liver, and other digestive organs, are often affected by diseases of the heart, may likewise be made a source of information. Most of the connections which have been traced between affections of distant organs and the heart, have been imputed to augmented or impaired actions of the latter — most frequently to hypertrophy. But there is sufficient evidence to prove that interrupted circulation, caused by alterations of the valves or of the orifices, is much more concerned in the production of sympathetic disturbance, and even of structural lesion, of remote as well as associated parts, than hypertrophy, or excited action. An impeded passage of blood from the auricles occasions congestion of the venous system; serous effusion into shut cavities, and cellular or parenchymatous structures; hæmorrhages from mucous surfaces, or into the substance of organs; and not infrequently congestions or enlargements of the liver or spleen. When hypertrophy exists, it is generally caused by the increased action required to overcome an obstacle situated at the outlet from the hypertrophied compartment; yet still the obstacle is but imperfectly overcome, and the force of the current of blood beyond the seat of obstruction is even less than in health. The necessity, therefore, of ascertaining the pathological states of remote as well as of collatitious parts, in connection with the actions and sounds of the heart, in order to arrive at correct conclusions as to the diseases of the latter, is manifest. The relations of morbid actions must be duly estimated, without assigning a preponderating or an exclusive share to one or two conditions, and overlooking all the rest. No partial or empirical views should be entertained; and far less ought a charlatan-parade of examination be pursued and acted upon, to the neglect of physiological inquiry, and of rational deductions. There is as much empiricism at the present day in the modes of investigating and observing diseases, as in those of curing them; but there is this difference — that the empiricism of the former kind is much more *ad captandum* than the latter, and generally more fussy, and often more offensive.

27. iv. *Of the Nature and Arrangement of Diseases of the Heart.* — *A.* The *nature* of these diseases has been partially noticed, when viewing the alterations of structure attending or consequent upon them (§ 23, 24.). Of the intimate nature of these maladies we know nothing more than is intimated by function or action, or is made apparent on close inspection. — *a.* When disordered action is suddenly excited by mental emotions, or by affections of related parts, and as suddenly ceases, leaving the organ in the integrity of its functions, we infer that the disturbance is seated in, or extends to, that part of the organic nervous system which actuates it; and this view is confirmed by the *juvantia* and *lædentia*, and often by the appearances observed after death in persons who had been thus affected, and who had died of other diseases. In these cases, the disorder must, in the present state of our knowledge, be viewed as purely *functional*, or *nervous*, or *dynamico-vital*, as termed by various writers; and it may, without much stretch of ingenuity, be chiefly referred either to impaired action, or to excessive action. In these affections, the nervous system of organic life — particularly that part of it supplying the heart — is primarily disordered, and continues the only or chief seat of the disturbance for some time. But if either affection be excessive, or enduring, then alteration of structure may result, and assume one or other of the forms about to be noticed.

28. *b.* Diseases of a most serious nature often attack the heart, in which, conjointly with more or less disturbance of the organic nervous influence, the vessels supplying one or more of the constituent tissues of the organ, exert a morbid action, and give rise to various changes of structure, according to the grade of vital power, and to the state of the blood. These diseases frequently take place less obviously, or much more insidiously, than the foregoing, although often, also, in a severe and acute form; and they are always dangerous. The rapidity of their course, as well as the changes they produce, depends upon the intensity of the morbid vascular action, and the constitutional states just mentioned. From the circumstance of this action being attended by injection and development of the vessels, particularly of the capillaries, and giving rise to changes usually observed to follow inflammation in other parts similarly constituted, it has been denominated inflammatory. By this term, however, it is not intended to be implied that the morbid vascular action altogether consists either of diminution, or of augmentation, of the vital properties of the vessels; but that, as I have contended in the articles Disease (§ 87.), and Inflammation, it is rather an *alteration* — a *perversion* of these properties that constitutes inflammation, and not a change simply *dynamic*; this change, whatever direction it may take, forming only one of the elements of the morbid state. Beyond this, we can hardly advance in our analysis of the nature of inflammatory diseases of the heart; but we may infer, with some truth, that, when the organic nervous or vital powers are unimpaired, and the blood uncontaminated, the morbid vascular action will partake more or less of the excited or sthenic condition, will exert a formative process, and will most probably form lymph, which will coagulate if allowed to remain for any time in contact with the part which produced it; or occasion thickening, or a condensation of the affected parts; or give rise to other changes varying with the grades of action; — and we may further conclude, with equal justice, that, when the vital powers are depressed or exhausted, or the blood altered or contaminated, the local morbid action will be asthenic, will be incapable of developing the changes just specified, and, in their place, will produce, according to its seat, a sanious or sero-sanguineous fluid from the surfaces, that will further contaminate the blood, if the internal membrane be implicated, or give rise to softening, discolouration, &c. of the substance of the organ, if this part become affected.

29. — *c.* Under the above two heads may be comprised those affections of the heart which may be said to be primary, as respects this organ, although they are often associated with, or even

preceded by, disorder of other viscera, as well as by alteration of vital power and of the circulating fluids. But there is another class of cardiac diseases, which present different characters, and consist, in a great degree, of change of structure, often associated, however, with disorder of the organic nervous influence, and sometimes also with more or less marked alteration of vascular action in one or more of the constituent tissues, or compartments, of the heart. They may be said to proceed from the morbid conditions already discussed, especially when these exist in sub-acute, or in slight or chronic forms. That this is the case, will become apparent, when I come to describe them individually. It will then be fully shown, that impaired, or irregularly exerted, nervous influence, and morbid vascular action, in one or more of the constituent structures of the organ, have, together or singly, altered their nutrition, or impaired the vital cohesion of the molecules of which they are formed; and that the consequences of altered nutrition and impaired vital cohesion chiefly consist of the increased or diminished thickness and density, the augmented redness and elasticity, the softness, the dilatations, &c., of the parietes of the cavities; and of the fungous or polypous excrescences, the cartilaginous and osseous formations, and the different morbid productions, &c., found in the heart and pericardium.

30. *B.* Conformably with the above view of the nature of affections of the heart, I shall divide them into — 1st. *Disorders which are merely nervous, or functional, and chiefly dependent upon the state, or distribution, of the ganglial nervous influence, particularly in respect of this organ;* and under this head will be comprised — (*a*) *Impaired and irregular actions of the heart;* — and, (*b*) *Excessive action of the heart.* —

2d. *Diseases in which, conjointly with more or less disturbance of the organic nervous influence distributed to this organ, the blood-vessels of one or more of its constituent tissues manifest a perverted or morbid action.* Under this division will be considered — (*a*) *Inflammation of the endocardium or internal membrane of the heart;* — (*b*) *Inflammation of the pericardium;* — and, (*c*) *Inflammation of the substance of the heart, or carditis.* —

3d. *Organic or consecutive lesions of the heart, resulting from, and often associated with, one or more of the above pathological conditions.* Under this head will be discussed — (*a*) *Atrophy of the heart;* — (*b*) *Œdema of the organ;* — (*c*) *Softening and hardening of the structure;* — (*d*) *Adventitious productions in the heart;* — (*e*) *Changes of the dimensions of the orifices and valves;* — (*f*) *Changes in the dimensions of the cavities of the heart;* — (*g*) *Hypertrophy of one or more of the compartments;* — (*h*) *Rupture and wounds of the heart, &c. &c.*

31. v. *Of the Course, Termination, and Duration of Cardiac Disease.* — Affections of the heart may be *acute, sub-acute,* or *chronic.* — *A.* Those which are *nervous,* or functional, are most frequently chronic, remittent, or even periodic; yet they are sometimes acute, and of very short duration, as in cases of cardiac syncope, &c.; and frequently terminate without any lesion of structure, although they occasionally induce it. — *B.* *Inflammations* of one or more of the constituent tissues of the heart may assume any grade of intensit, and pursue accordingly an *acute* or *chronic* course, or even any of the intermediate or sub-acute states. The chronic form may be consequent upon the acute; or it, as well as the sub-acute, may appear primarily, especially when the inflammatory action is limited in extent, or is confined to a single constituent tissue of the organ. Although they may terminate in resolution, yet they most commonly give rise to organic changes, amongst which must be ranked the effusions of fluid, &c., frequently met with in the pericardium. — The more intense states of inflammation of either of the surfaces, or of the substance of the organ, may terminate fatally in two or three days, whilst the less severe or chronic states may continue months, or even years. But when they become thus prolonged, it is generally owing to their having passed into organic change, or to a temporary subsidence of the morbid action, and to returns or exacerbations of it, under moral or physical influences. — *C.* *Organic lesions* of the heart are extremely uncertain as respects their course, duration, and termination. Even when most manifest and extensive, their symptoms and progress are by no means uniform; the most distressing phenomena, as in inflammations of the organ, often varying, disappearing, returning, or pursuing very different courses, in separate cases, or even in the same person at different periods. They frequently, also, present more or less evident remissions and exacerbations, or even a marked periodicity. This circumstance probably induced Corvisart, and especially Rostan, to refer many cases of nervous asthma to organic disease of the heart. But this circumstance is explained by the fact already adverted to — that change of structure, even when most prominent, is only one of the elements of the cardiac malady, the organic nervous energy of the organ being also always more or less affected; and we know that intermittence, or periodicity, is characteristic of affections of the nervous system. — The exacerbations or violent paroxysms which patients with organic lesions of the heart experience, is not, however, altogether owing to periodicity of the morbid action, but is often excited by mental emotions, by errors in diet, by over-distension of the stomach or colon, by neglect of the excreting functions, and by exposure to atmospheric vicissitudes.

32. vi. *The Complications of Diseases of the Heart,* are important objects of consideration, in respect both of the associations of these diseases with one another, and of their connection with other maladies. — *A.* *Nervous affections* of the heart are often attendant upon disorders of the digestive organs, on flatulency, on congestions of the liver, and on disorder of the respiratory functions. They are frequently also observed in the course of chlorosis, hysteria, and anæmia; and are often excited by affections of the womb, and by the puerperal states. Indeed, the numerous pathological causes (§ 20.) of cardiac diseases form also complications with them. — *B.* *Acute or chronic inflammation* of the internal membrane of the heart sometimes extends to the pericardium; and inflammation commencing in the latter surface very frequently reaches the former. This association of inflammation of both surfaces, or extension of the morbid action from the one to the other, especially from the external to the internal membrane, is to be explained by the

proximity of the one to the other in certain parts of the organ, and by the circumstance of the connecting cellular substance being frequently implicated, especially when the pericardium is inflamed. This fact, which is much insisted upon by Bouillaud, has been taught in my lectures since 1825. — *C.* Inflammations of these membranes are also often complicated with, or consequent upon, acute articular rheumatism, or inflammation of the pleura or lungs. This association is met with in a very large proportion of cases of these diseases.— *D.* The complication of *organic lesions* of the heart with those of the large vessels, and particularly those of the aorta, are well known; and of softening, dilatation, &c., with adynamic fevers, scurvy, purpura, &c., has been often remarked. The connection existing between obstructions at the orifices of the heart, and commencement of the large vessels, and hypertrophy; and between these and diseases in the lungs and brain, especially apoplexy, palsy, pulmonary hæmorrhage, effusion into the cavities of the chest, anasarca, &c.; will be more fully shown in the sequel.

33. vii. *The Prognosis of Cardiac Diseases.* — Senac and Corvisart entertained the most unfavourable opinion as to the result in diseases of the heart. The latter writer even affixed the epigraph — "*Hæret lateri lethalis arundo*" — to the titlepage of his work. At the present day, more favourable ideas are entertained on this subject, although the opinion of Corvisart will still hold with respect to some of the organic changes of the organ. — *a.* The *nervous affections* of the heart will frequently yield to treatment, unless they be very violent, when an unfavourable, or at least a guarded, prognosis should be given. — *b.* *Inflammations* of the membranes, and even of the substance of the heart, if they come early under treatment, will often terminate favourably; yet they ought, nevertheless, to be viewed as very dangerous maladies, as respects both the organic lesions they may cause, and the contingency of an immediate or sudden dissolution. — *c.* Most of the *organic lesions* of the organ are incurable; and yet the patient may live many years, when judiciously managed. — Of this kind are, induration of the valves, narrowing of the orifices, chronic pericarditis, hypertrophy, &c. — The unceasing functions of the heart, and their extreme importance to the economy, however, render diseases of it more dangerous than those of almost any other organ. But the advances that have been recently made in their diagnosis, have given greater precision to the treatment, and have consequently afforded a greater degree of success, than formerly.

34. viii. *The Treatment of Cardiac Affections.* — *A.* The *nervous affections* of the heart, especially those associated with disorder of the digestive and assimilative organs, or characterised by irregular or excessive action, have been too generally, and most injuriously treated, by vascular depletions and purgatives. I have seen even the complication of palpitation with chlorosis treated by depletions, and a complete state of anæmia result. In cases of this kind, a judicious selection of tonics, chalybeates, anodynes, and stomachic aperients, appropriately to the peculiarities of each, aided by light, nutritious diet, by gentle exercise in an open dry air, and sometimes by tonic and alterative mineral waters, will generally remove the complaint.

35. *B.* The *inflammatory diseases* of the heart require more or less copious and repeated depletions, — in the acute stage, the most decided adoption of them, as well as of other antiphlogistic means. — M. Bouillaud has strongly insisted upon the propriety of prescribing repeated bloodlettings; but, although the depletions he recommends are considered large, in France, they are not larger than those usually directed in this country for the same diseases. The exhibition of calomel and opium, or of calomel, antimony, and opium, in repeated doses, to promote the resolution of the inflammatory action, or to prevent it from passing into the chronic state or from terminating in effusion, or to limit the effusion of lymph, or to prevent the organisation of what may have been effused, and promote its absorption, is the next most important means, and should always follow immediately after a decided vascular depletion, in the manner described in the article Blood (§ 64—68.). — This practice, somewhat modified from that adopted by British medical practitioners in warm climates, was first brought into use in this country, by Dr. Hamilton, of Lynn Regis (*Medical Comment, &c.* vol. ix. p. 191. Lond. 1785.). His paper on this subject — the most valuable in modern medical literature — contains all the modifications that have been attempted in this practice, by Dr. Armstrong and other more recent writers, with the view of appearing original. It has been erroneously stated, by several who have adopted this treatment, that Dr. Hamilton always prescribed these medicines until the gums were affected by them; and it has been claimed as a point of originality, that they have employed the same means so as not to produce, or short of producing, this effect. In some complaints, however, and even in some of those under consideration, this effect is necessary to the successful operation of these substances. That Dr. Hamilton, however, thought it unnecessary to employ them, in certain diseases, as rheumatism, &c., so as to affect the mouth, is shown by his remarks respecting their operation (*Opus citat.* p. 200.). He there states, that when they act upon the skin, or bowels, relief will accrue from them without the mouth becoming affected; and that, when the skin is dry, hot, or contracted, emetic tartar should be added to the calomel and opium, in order to determine to this surface.

36. When inflammations of the heart come under treatment at a more advanced stage, or when they have assumed a more chronic form, vascular depletions must be prescribed with greater caution, and the calomel and opium should be given, until either the gums become affected or a slight ptyalism be produced. If the action of the heart be irregular, or excited, a small quantity of camphor may be added to each dose of these medicines; and, if the pulse be hard and regular, a repetition of the bloodletting, and a combination of James's powder or of tartar emetic, or of ipecacuanha, with the calomel and opium, will act beneficially, both upon the circulation, and upon the emunctories. The bowels should be kept freely open, and the action of aperients be promoted by enemata.

37. Although it is necessary to have recourse

to copious depletions in the acute or early stage of inflammations of the heart, yet their effects should be carefully watched; and they ought to be still more cautiously employed in chronic or advanced cases; for there are very few inflammatory diseases, in which they may prove more beneficial, than in these, if they be resorted to at the proper time, and in sufficient quantity; or in which they may be more injurious, if too long delayed, or too sparingly employed, or carried too far. When prescribed in a timid manner, and if a decided use of calomel and opium, sometimes with antimony, colchicum, or other adjuvants, be not adopted, an acute inflammation, which would otherwise have entirely subsided, either passes into a chronic state, or gives rise to organic changes embittering the shortened period of future existence. Yet, whilst thus prompted to decision, it must never be overlooked, that in most cases of inflammation affecting this viscus, the organic nervous energy is more or less impaired or irregularly determined; and that the most decisive measures should, therefore, be directed with the utmost circumspection. The other means which may be brought in aid of those already noticed, are comparatively of so little importance, and require to be so varied according to the forms and stages of the disease, that no mention need be made of them until the specific affections of the organ come under consideration.

38. *C.* The *organic lesions* of the heart require a much more prudent recourse to depletions than the diseases just dismissed, inasmuch as the nervous influence, especially that actuating the organ, is much more impaired, in the former maladies than in the latter. In cases of dilatation of one or more of the cavities, even a moderate depletion may be followed by a fatal result; and when there is hypertrophy, the heart requires all the energy it possesses to overcome the obstacle in the way of the circulation. The small but repeated depletions, and the antiphlogistic regimen, recommended by Valsalva and Albertini, and so generally adopted in organic diseases of the heart, may be carried too far, as Corvisart has judiciously shown. They may be even most injurious. There are few means which are universally, or even generally, applicable to these lesions, excepting mental and physical quietude, and attention to the digestive and excreting functions. Vital energy seldom admits, in them, of being lowered; and whatever acts in this manner, should be employed with discrimination, or appropriately to those states which seem specially to require it. — In them, also, moral training, attention to diet, living in an equable temperament, and in a healthy and airy situation, a gently open state of the bowels, and a due secretion of bile, and the careful avoidance of whatever excites or aggravates the disorder of the heart, are amongst the most generally applicable means of treatment. Numerous other measures may be employed, but they are applicable only to particular lesions, and therefore will be mentioned where the treatment of these lesions is particularly discussed.

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III. Of Nervous or Functional Affections of the Heart.

i. Of Impaired or Irregular Action. — Classif. I. Class, III. Order (*Author*).

39. Defin. — *The action of the heart more or less weakened or irregular, with faintness, or depression, and often with disorder of the digestive organs.*

40. The functions of the heart may be imperfectly performed in two principal ways; — 1st. They may be simply weakened, but in every grade, until they become extinct, and yet structural lesion may not be detected to account for

the circumstance. — 2d. They may be impaired or enfeebled, with more or less irregularity of the contractions, and yet no organic change may exist; the impaired and irregular action occurring only temporarily. One of the most familiar forms in which this affection presents itself, is that of fainting or syncope. But in this the heart is not always primarily affected. — *A. Simply Enfeebled Action of the Heart*, depending upon deficient energy of the cardiac ganglia, may proceed from whatever depresses the organic nervous influence, or from inanition or anæmia. It may also be sympathetic, or the result of a derivation of the vital influence to different organs, as during certain periods of impregnation. The causes, pathological states, the diagnosis, and treatment of this affection, are fully described under the article Fainting.

41. *B. Enfeebled and Irregular Action of the Heart*, is a common affection in its slighter grades. — The pulsations may be unequal, in frequency and power, or they may be intermittent, reiterated, or fluttering. This state of action, although attending various dangerous diseases of the organ, may be entirely nervous, or connected with depressed organic nervous power, and enfeebled function of the stomach and liver. In this latter case especially, it is often induced by flatulence, particularly when the flatus rises into the œsophagus and is retained there by spasm of the canal. It also may proceed from mental emotions, or from whatever overloads the cavities of the heart, or interrupts the return of blood from the lungs, or causes congestion of the left auricle and pulmonary veins.

42. *C. Treatment.* — Unless it is attended with a sense of sinking, or oppression, or anxiety, at the præcordia, this affection requires only attention to the digestive, assimilating, and excreting functions, and to diet and regimen. But if these symptoms are present, restoratives, especially camphor, the preparations of ammonia, the æthers, carminatives, and tonics conjoined with either of these, will often be necessary. Much advantage will also result from taking a digestive pill (F. 507. 562.) at dinner or bed-time. A small or moderate bloodletting is not infrequently prescribed in cases of this kind, with the view of removing congestion of the heart or large vessels. When the patient is plethoric, or when the irregularity is consequent upon the suppression of an accustomed evacuation, or of congestion of the portal system, this practice is judicious, if cautiously resorted to. In the latter circumstances, the application of a few leeches around the anus will often be of service. The bowels ought also to be freely acted upon by deobstruent and mild purgatives. In these cases, although there may be vascular plethora, or local congestion, nervous or vital power is at the same time more or less impaired, and therefore the means of restoration just mentioned should also be employed. The treatment about to be advised for palpitations (§ 50.) is often also appropriate in this affection. — When enfeebled and impaired action of the heart occurs in gouty persons, or appears as *misplaced* or *retrocedent* Gout, the means advised under such circumstances in that article (§ 83. 89.) should be prescribed.

ii. Excited Action of the Heart. — Syn, Καρδιωγμὸς, Hippocrates, Galen; *Cordis Palpitatio, seu Pulsatio, Palmus* (παλμὸς, a beating or palpitation); *Cardiopalmus*, Swediaur; *Tremor Cordis, Palpitatio*, Cullen, et Auct. var.; *Palmus Cordis*, Young; *Clonus Palpitatio*, M. Good; *Palpitation, Palpitation du Cœur*, Fr.; *Das Herzklopfen*, Germ.; *Palpitazione*, Ital.; *Palpitation, Palpitation of the Heart.*

Classif. — 2. *Class*, 3. *Order* (*Cullen*).
4. *Class*, 3. *Order* (*Good*). II. Class,
I. Order (*Author*).

43. Defin. — *Strong, frequent, or tumultuous action, with an increase of the impulse and natural sounds of the heart, so as to be sensible, and often distressing, to the patient, without appreciable lesion of the structure of the organ.*

44. *A. Palpitations* are either *nervous* or *functional*, or *symptomatic* of some one of the more serious diseases of the heart, hereafter to be considered. The former only of these fall under discussion at this place. — Nervous palpitations may be either *primary*, and depending upon excitement of the nerves of the heart, without manifest disorder of other viscera, as in attacks induced by moral emotions; or *sympathetic* of affections of remote or related organs. They are often sudden in their accessions, but more rarely so in their subsidence. The sounds of the organ are generally increased during their continuance; and the first sound is further augmented by the impulse or shock against the ribs, occasioning a distinct knock, which may be sometimes heard at a short distance from the patient. They are also occasionally attended by a slight bellows sound, which always disappears when the heart resumes its natural action. Nervous palpitations are often accompanied with uneasiness and slight anxiety at the præcordia; and sometimes, also, with a sense of sinking, or faintness, with which they not infrequently alternate.

45. *B.* The *Causes* differ much in their natures, or modes of operation; and modify accordingly the characters of this affection. — The nervous and irritable temperaments, early age, debility, in whatever way induced, venereal excesses, and mental exertion, remarkably *predispose* to this disorder. — The *exciting causes* are — 1st. The more active mental emotions, as fright, anger, joy, &c.; also sadness, anxiety, melancholy, nostalgia, longings after objects of affection, excitements of the imagination, &c.; — 2d. The abuse of spirituous liquors, and muscular exertions, or whatever accelerates the return of blood to the right side of the heart, and over-distends the large veins and auricles; — 3d. Excessive or debilitating discharges; the abstraction of a natural or necessary stimulus; sexual excesses, or manustupratio; this last being the most common and influential of the exciting causes; — 4th. Inanition, from deprivation of the necessary nourishment, or from impaired assimilation, or from excessive waste of the secretions, or circulating fluids, as in the palpitations associated with chlorosis and anæmia, or consequent upon depletions; — 5th. Pressure on the large vessels, occasioned by strait lacing, by pregnancy, by abdominal tumours, effusion, &c.; — 6th. Enfeebled action of the digestive functions, particularly when attended by flatulency and torpor of the liver, or constipation of the bowels; — 7th. The irritation of worms in the intestinal canal, in connection with debility, &c.; — 8th. Hysteria in

several of its Protæan forms, especially when the uterine functions are disordered, and the catamenia either excessive or obstructed; — 9th. Irritation of the spinal chord, or of its nerves, or excitement of the uterus or ovaria acting upon the heart, either directly by the great sympathetic nervous system, or mediately through the spinal chord; the irritation propagated to this latter being reflected from it along the branches communicating between it and the cardiac and other sympathetic ganglia.

46. Although these may be considered the principal causes, yet others sometimes produce functional palpitation; especially several *antecedent disorders*, and organic lesions, as — *a*. Adynamic and nervous fevers; — *b*. General plethora by overloading the auricles and large vessels; — *c*. Irregular, or misplaced gout, occasioning irritation of the cardiac nerves, or congestion of the large vessels or cavities of the viscus; — *d*. Obesity, particularly in connection with plethora; — *e*. Obstructed circulation through the lungs, owing to diseases of their structure, or to effusions of fluid pressing upon them, or other causes preventing their expansion; — *f*. Enlargements of the abdominal or pelvic viscera, or effusions into the peritoneum, preventing the easy descent of the diaphragm, or pressing upon that part connected with the pericardium, as enlarged or engorged liver or spleen, pregnancy, ascites, &c.

47. *D. Course and Duration of Nervous Palpitation.* — *a*. This affection varies somewhat according to the cause which produced it. — *α*. When it proceeds from *mental emotions*, it is often violent, but of very short duration. — *β*. When it arises from *manustupratio*, it is not so excessive; but it is more prolonged; or remittent or recurrent. — *γ*. Palpitations *sympathetic of dyspepsia* are seldom severe, unless in persons of the nervous or irritable temperaments, nor of long duration; but they are readily excited, particularly by a full meal, or by indigestible, or flatulent, or fluid food. In such cases the action of the heart is irregular, as well as excessive, tumultuous or fluttering, and attended by anxiety, sometimes by pain, and by accelerated breathing or dyspnœa. — *δ*. When this affection proceeds from *misplaced*, or *retrocedent gout*, it is generally severe; more, however, from the attendant sensations, than from the violence of the palpitations. The action of the heart is excessive, most irregular, or tumultuous, and attended by distressing anxiety, or sense of sinking or of anguish at the præcordia often extending to the epigastrium, and by extreme restlessness, and a feeling of impending dissolution. — *ε*. Palpitation is very often *an attendant of hysteria*; and in this case is excited or aggravated by the globus hystericus, or by the borborygmi or intestinal flatulence, characterising the latter affection. A feeling of strangulation frequently accompanies this form of palpitation; and, in two or three instances, I have observed an almost sudden swelling of the thyroid gland to take place, this part returning to, or nearly to, its former state very soon after the attack. In more than one of these cases, there was evidence of co-existent irritation or excitement of the uterine organs. Hysterical palpitation sometimes alternates with faintness, or is connected with excessive menstruation. It occasionally also follows abortions, floodings, &c. — *b*. The *Duration* of palpitation is most indefinite. It may continue only a few minutes, or many days. It may be remittent, intermittent, or even periodic; but its course is more generally irregular.

48. *E. Diagnosis.* — It is often easy to distinguish nervous palpitation from that symptomatic of organic lesion; but quite as often the diagnosis is very difficult. That it should be made with accuracy is most important, as respects both the treatment, and the immediate happiness of the patient; for many distress themselves and aggravate their complaints with fears of an organic malady, whilst they are affected only with functional disorder. When nervous palpitations are prolonged, remittent, or return frequently and are severe, the diagnosis is generally difficult: if attempted during their continuance, it is still more so; and if deferred until the period of intermission, it is often not much less difficult; for some organic lesions occasionally present periods, in which the symptoms are remarkably ameliorated. Yet an attentive examination of the whole chest by percussion, auscultation, by the eye, and by the touch, will generally determine the question with great accuracy, and show that, in this affection, the heart is not enlarged, and that the blood circulates freely through its various orifices. The extended dulness on percussion, the morbid or adventitious sounds, the more or less constant dyspnœa, the venous congestions, the bloated state of the countenance, the dropsical effusions, &c., sufficiently mark organic lesion of this organ, especially if it have become far advanced. Sometimes, however, great nervous sensibility, or an hysterical affection, may be attendant upon some degree of alteration of structure; the palpitation recurring in severe paroxysms after slight mental emotions, or other causes affecting the nervous system, and leaving the patient comparatively easy, and with few precise or well-marked symptoms in the intervals. This is not infrequently observed in persons who have been subjects of inflammation of one or more of the constituent tissues of the heart, that has left behind it slight structural change in connection with an irritable state of the organ, and great susceptibility of the nervous system.

49. In addition to these considerations, the following circumstances may be adduced as distinctive of a functional disorder: — 1st. The general prevalence of nervous symptoms, and the recurrence of the attack from causes acting on the nervous systems; — 2d. The return of the affection when the patient is quiet, and the relief following gentle or moderate exercise in the open air, and the means used to improve the digestive functions and to restore the nervous energy; — 3d. The prolonged and complete intermissions during an improved state of the general health, and the exacerbations consequent upon whatever depresses or exhausts organic nervous power, especially upon the operation of any of the causes enumerated above (§ 45, 46.); — and, 4th. The absence of the physical signs characterising any of the inflammatory and structural diseases about to be considered.

50. *F. Treatment.* — *a*. The means prescribed for this affection should have a very strict reference to the causes which produced it, and especially to the pathological state of which it is

sympathetic. If it be independent of vascular plethora, or of disease of remote organs — if it be primary and the consequence of enfeebled or exhausted nervous influence, or of *inanition*, *anæmia*, *chlorosis*, &c. — chalybeates, tonics, and restoratives, regular exercise in the open air, change of air to the seaside, the use of the tepid or cold bath, sea-bathing, light and nutritious food, an infusion of green tea*, early hours, and healthy employment, the bowels being regulated, or preserved open by an occasional dose of a mild stomachic purgative, or by a tonic, carminative and purgative conjoined, are the most appropriate remedies. — For persons who are of an irritable or nervous temperament, or who cannot bear the immediate use of chalybeates, the stomachic bitters, or vegetable tonics, with the alkaline subcarbonates, or the preparations of ammonia, will be most serviceable; and afterwards quinine with sulphuric acid, and æther, or with camphor; or the decoction of bark with the hydrochloric acid and chloric æther; and, lastly, the metallic salts, especially the sulphate of zinc, or of iron, or the nitrate of silver; may be prescribed. I have for many years employed the nitrate of silver triturated with the extract of hyoscyamus with great benefit in this affection, as well as the sulphate of zinc similarly combined. The various strengthening mineral waters, and amusements in the open air, will also prove beneficial.

51. *b.* When palpitation proceeds from *masturbation* — a more prevalent vice than is generally supposed — the preparations of iron, with camphor; the tincture of the muriate of iron; the tonic infusions or decoctions, with the alkaline subcarbonates, with the solution of potash, or with BRANDISH's alkaline solution; soda water or Seltzer water, as a common beverage; early rising, and regular exercise in the open air; will be found the most useful means of cure; but they will all fail if the cause still continues. — *c.* Palpitation in connection with *plethora* requires a moderate bloodletting, which may be repeated in some instances; a restricted and chiefly farinaceous diet, and the daily use of stomachic or mild purgatives, early rising, and regular exercise. This form of the affection is not uncommon during the early months of *pregnancy*, and may be treated by the means just named. — *d.* When this affection is symptomatic of *dyspepsia*, the treatment must depend upon the state of the vascular system. If this system be plethoric, then the remedies now specified should be prescribed, the excreting functions freely acted upon, and the biliary secretions promoted. (See INDIGESTION.) — *e.* The palpitations arising from *gout*, are generally relieved by camphor conjoined with acetate or muriate of morphia, or with hyoscyamus, and by a copious action of the bowels procured by warm stomachic purgatives, with which magnesia or the alkaline subcarbonates may be conjoined. In this, as well as in the dyspeptic form of palpitation, I have seen much benefit accrue from the hydrocyanic acid, given three times a day, in a tonic infusion, an absorbent and carminative tincture being added; but the bowels should previously be well evacuated. (See art. GOUT, § 86.)

52. *f. Hysterical palpitations* require, according to the degree of plethora, or of inanition, nearly similar means to those already mentioned, and attention to the uterine functions. The bowels should be kept open by cooling aperients; and, if there be much debility, tonic infusions, with the muriate of ammonia, or nitrate of potash, or subcarbonate of soda; the infusion of valerian, with the fœtid spirit of ammonia, &c.; and other remedies enumerated in the article HYSTERIA; may be directed, according to the pathological peculiarities of the case. The existence of pain or tenderness in any part of the spinal column should also be ascertained in this form of the affection; and, if either be present, the means calculated to remove it ought to be resorted to. — *g.* When palpitation depends upon *chlorosis* or *anæmia*, a combination of the sulphate of iron with aloes, and an aromatic powder in the form of pills, is generally of service. I have seen great benefit derived from one or two grains of the sulphate of iron, with three of the aloes and myrrh pill, and an equal quantity of the extract of conium, given twice or thrice daily. The formulæ, also, in the *Appendix* (F. 519—525.), will prove equally serviceable. — *h.* In the palpitation connected with *chronic bronchitis*, or with *asthma*, an infusion or decoction of senega, with aromatics and anodynes; camphor, assafœtida, and other remedies advised in these articles; are indicated. — *i.* When this affection is caused by *intestinal worms*, or by *enlargement* of any of the *abdominal* or *pelvic viscera*, or by *ascites*, or by *effusion* into the *pleural cavities*, the treatment should be chiefly directed to the removal of these maladies.

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* In the summer of 1820, I was requested by a practitioner to see the daughter of a clergyman, residing in Westminster, labouring under most violent nervous palpitations, which had resisted the means advised by several physicians who had been consulted. She was in bed; and the impulse of the heart moved the bedclothes, so that the pulse could be counted by the eye at the furthest part of the room; and the knock of the heart against the ribs could be heard at the distance of some feet. She was thin, delicate, and highly nervous. Finding that the usual remedies for nervous palpitation had been prescribed without any relief, I suggested that a strong infusion of *green tea* should be given three or four times a day, and continued for a few days. Relief immediately followed, and perfect recovery in two or three days.

t. i. n. 8. (*Nitre with tonics.*) — *Laennec*, Auscult. Médiate t. ii. p. 227. Paris, 1829. — *A. Portal*, Mém. sur la Nature et Traitement de plusieurs Maladies, t. iv. p. 173. Paris, 1819. — *Merat*, in Dict. des Sciences Médicales, t. xxxix. p. 134. — *J. Johnson's* Med.-Chirurg. Rev. vol. iv. p. 370., vol. v. p. 277. — *Andral*, Dict. de Médecine, t. xvi. 8vo. Paris, 1826. — *J. Frank*, Praxeos Medicæ Universæ Præcepta, vol. ii. pars ii. sect. ii. p. 370. — *J. Hope*, Cyclop. of Pract. Med. vol. iv. p. 232. — *J. Bouillaud*, Traité Clinique sur les Mal. du Cœur, t. ii. p. 486.

iii. Painful or Neuralgic Affections of the Heart. — Classif. II. Class, I. Order (*Author*).

53. Charact. — *Sudden attacks of anguishing pain in the cardiac region, returning at intervals; the actions and sounds of the heart, and respiration, being but little affected.*

54. In the same category with the disorders just considered may be arranged those painful affections which have been considered as neuralgia of the heart. They might be viewed as modifications of Angina Pectoris, and arranged with it, if there were sufficient evidence to prove that they are actually seated in the nerves of this organ. But, as Bouillaud observes, although the functions of the heart may be disordered in connection with them, the nerves of the adjoining viscera and structures are probably as much affected as those of the heart. A case of this complaint has been described by Dr. Elliotson, and is altogether similar to some that have occurred in my practice. Indeed, *neuralgia* of the cardiac and communicating nerves, or affections intermediate between it and *angina pectoris*, are by no means rare. A case of this affection came under my care in 1821; and since then I have treated six similar cases: two in females between the ages of twenty-five and thirty, three in gentlemen somewhat upwards of fifty, and a sixth in a physician of about thirty-five years of age.

55. *A. Diagnosis.* — According to the phenomena observed in these cases, this complaint is characterised as follows: — A most acute, lancinating, and anguishing pain is felt to the left of the sternum, darting through the region of the heart, often from under the left nipple backwards to the spine or left shoulder-blade. Sometimes it is confined to this organ; and occasionally it extends to the left brachial plexus, and up the left side of the neck, or left arm, or to other parts in the vicinity of the heart. This complaint is generally intermittent, or remittent, or even periodic in its character; the paroxysms are sudden or almost instantaneous in their accession; and their duration is very variable. They leave the patient intervals of comparative ease, when the pain is dull or aching, and confined to the region of the heart. They return at various intervals; sometimes once or twice in the day, and occasionally not for several days. They are attended by the utmost agony and distress. The actions of the heart are somewhat accelerated during the fit, and sometimes more or less irregular or turbulent; but they are also in other instances nearly natural. There is no morbid sound, beyond a slight bellows-sound in a few cases, heard on auscultation; and the breathing is tranquil. The paroxysm may take place at any period, and when the patient is perfectly quiet, mentally and physically, and without the occurrence of any cause sufficient to account for the seizure. This affection does not appear to be aggravated, or its attack to be favoured, by exercise, or by motion or position; but, on the contrary, it seems to be benefited by gentle exercise in the open air. Debility and loss of flesh generally are induced by the excessive suffering; but the appetite is not materially impaired. The powers of digestion are, however, weakened, and the bowels are more or less sluggish. — This complaint is generally of long *duration*. The shortest period in my cases was six or seven months; and in one, where the intervals between the attacks were very considerable, it was as many years.

56. *B. Causes.* — Of the six cases above referred to, two were females. They were both unmarried; but the catamenia were perfectly regular; and neither of them had ever complained of any hysterical symptom, or had experienced pain in the spine. Of the four males, the two most advanced in life had formerly had gout; and in one of them, who was under the care of Dr. Roots and myself, the cardiac neuralgia was induced by grief. The other two were medical practitioners: one of them had been engaged in a laborious practice in the country; the other had experienced family contrarieties and disappointments, and was endowed with the utmost susceptibility and irritability. — The recurrence of the attack seems to be favoured by cold, especially by cold east winds; and there is reason to believe that malaria is concerned in causing it. In a violent case, recorded by M. Andral, no trace of organic lesion was observed on dissection.

57. *C. Treatment.* — The means of cure in this affection are not materially different from those advised for Angina Pectoris, to which it is an intimately allied affection. As in that complaint, so in this, and in Palpitations (§ 50.), the indications are — 1st. *To shorten the attack*; — 2d. *To prevent the recurrence of it.* — *a.* The remedies I have found most efficacious in fulfilling the *first intention*, are — *camphor* in large doses with *opium*, or acetate of morphia; the *prussic acid*, with camphor, or ammonia, or other stimulating antispasmodics, or warm carminatives and tonics; a full dose of *calomel*, with camphor, *capsicum*, and opium, or the muriate of morphia; the preparations of *colchicum* conjoined with ammonia, camphor, the subcarbonate of soda, &c.; a *mustard poultice* applied as hot as it can be endured over the epigastric region; and a plaster, consisting chiefly of extract of *belladonna* and camphor, placed over the præcordia. I have tried various narcotics, besides these just named; but less certain advantage has been derived from them than from those. The extract or tincture of *aconitum*, or of *stramonium*; or the powdered root or leaves, or the extract, of *belladonna*; are, however, often of service, especially when the medicines just mentioned have failed.

58. *b.* The *second intention* has been best answered by purgatives, by mild and chiefly farinaceous food, by abstinence from stimulating liquors, by tonics conjoined with absorbents and stimulants, and by external drains or derivatives long persisted in. The *carbonate of iron*, in large doses, the bowels being kept freely open, has been sometimes of service. — Dr. Elliotson found benefit from it in one instance; but it has failed in other cases; and equal advantage has been derived from a combination of *sulphate of quinine, camphor*, and as much puri-

fied extract of *aloes* as acted freely on the bowels. In one of the female cases alluded to, the *nitrate of silver*, given with a narcotic extract, was extremely serviceable. In the other, pills, containing as much *croton oil* as procured at least three or four stools daily, were regularly continued for a considerable time, and a *large issue* was kept long discharging. Complete recovery took place in both instances. In one case, change of air, travelling, attention to diet, and *issues* in the side, effected a cure, the patient being a physician of great learning and extensive medical knowledge. In another case, the symptoms were aggravated by depressants and abstinence; and recovery took place during a recourse to *tonics* conjoined with *anodynes;* to a generous and light diet — the patient being allowed from four to six glasses of old wine, or even more, daily; and to change of air, and the amusements and distractions of watering-places. In one instance, great benefit appeared to follow the persevering use of *croton oil* as an external derivative; an eruption over the epigastrium having been kept long out by its means. In the case of a medical practitioner from Devonshire, who very recently consulted me, all these, as well as other means, altogether failed. At last, an ointment containing *aconitine* was directed to be rubbed over the sternum; but of the effect of this I am yet ignorant. In another instance, no benefit followed the application of an ointment containing *veratria*.

59. Besides the substances already mentioned, I have tried many others. — *Digitalis* has been of no service. Some benefit, however, has followed the internal use of *turpentine* given in drachm doses until it affected the urinary organs; and from the *hydriodate of potash*, or *hydriodate of iron*, conjoined with narcotics. — I tried *créosote* in one case without any advantage. I think that the disease may wear itself out, in some instances, without being much relieved by medicine, if attention be paid to diet and regimen, and to the state of the stomach and bowels, and if the energies of life be supported or promoted by suitable means. — At present, I am attending a gentleman who has been for many years afflicted with this complaint, the paroxysms of which, however, come on after considerable intervals. He was formerly subject to gout, which I have attempted to excite in the lower extremities without avail. He has consulted many physicians in London and on the Continent, and has even given homœopathy a lengthened trial. On no occasion had he experienced any material relief. I was requested to see him six or seven years ago; and have since continued to prescribe for him occasionally, excepting whilst he had recourse to means prescribed by Dr. Turnbull, from which he derived no benefit. The attacks are shortened and relieved by the medicines mentioned above (§ 57.); but they still recur, although not so frequently as before; attention to diet, an open state of the bowels, and gentle exercise in the open air, being found most efficacious in deferring their visitations.

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IV. Inflammations of the Heart and Pericardium.

— Syn. *Carditis*, Auct.; *C. Spontanea*, Sauvages; *Cauma Carditis*, Young; *Empresma Carditis*, Good.

Classif. — 1. *Class*, Febrile Diseases; 2. *Order*, Inflammations (*Cullen*). 3. *Class*, Diseases of the Sanguineous Function; 2. *Order*, Inflammations (*Good*). III. Class, I. Order (*Author*, in *Preface*).

60. Defin. — *Continued pain or anxiety in the region of the heart, palpitations, a tendency to syncope or faintness, dyspnœa, acceleration and irregularity of the pulse, with symptomatic inflammatory fever.*

61. Inflammations of the heart were first described by Rondelet, and afterwards by Salius Diversus and Forestus. More recently, they have received attention from many systematic writers; but, until the appearance of the works of Burns, Corvisart, Kreysig, Testa, Hildenbrand, and Laennec, their pathology and treatment were deficient in precision and accuracy. J. P. Frank first directed attention to inflammation of the *endocardium*, or internal membrane of the heart, especially in connection with inflammation of the internal surface of the bloodvessels. — Hildenbrand considered that inflammation might affect either the *pericardium* reflected over the heart, or the *substance of the organ*, or the *membrane covering the valves and internal surface* of the compartments; but that it was seldom confined to any one of these situations. — Of still more recent writers, some have entirely overlooked inflammation of the internal membrane, whilst others have very properly insisted upon its frequency and importance, in its various grades, and in respect of its diversified results. It is somewhat surprising that Laennec and Hope should have neglected this form of carditis, after attention had been directed to it by Frank, Hildenbrand, and Kreysig. M. Bouillaud has considered it much more fully than any former writer; but he is mistaken in thinking that he is the earliest writer upon it; for, in addition to the names just mentioned, Bertin, Barbier, Littré, P. M. Latham, Elliotson, and Watson, wrote upon it before the appearance of his excellent work. Hildenbrand expressly refers the lesions of the internal surface of the organ, and of the valves, to inflammation; these lesions having a more or less strict reference to the intensity and duration of the inflammatory action. (*Institutiones*, t. iii. p. 263.) Since 1824, I have described *internal carditis* in my lectures, and have pointed out the alterations of structure induced by it; and, in treating of inflammations and organic changes of the heart, I have always described it first, considering it as one of the most frequent forms of carditis, and, in its various grades, as the cause of most of the alterations observed in the structure of the organ. On the present occasion, I shall consider, *firstly, internal carditis*, or endocarditis; *secondly, external carditis*, or pericarditis; and, *thirdly, carditis proper*, or muscular carditis, with the lesions which are more immediately induced by them, individually and conjointly. Although it is necessary thus separately to discuss these diseases,

inasmuch as each may exist in a primary and distinct form; yet, as this is comparatively rare, I shall also consider their associations with each other, and with other maladies.

i. INFLAMMATION OF THE ENDOCARDIUM. — SYN. *Carditis Interna*, Author; *Endocarditis*, Barbier, Littré, Bouillaud; *Inflammatio Superficiei internæ Cordis*, Hildenbrand; *Internal Carditis*, *Inflam. of the Internal Membrane of the Heart.*

62. CHARACT. — *Oppression and anxiety at the Præcordia, with frequent faintnesses; dyspnœa; increased action, remarkable acceleration, and irregularity of the heart; and morbid sounds heard on auscultation; the pulse being weak, small, irregular, or indistinct.*

63. *A. History.* — The serous membrane lining the cavities and valves of the heart is occasionally found intensely red in one or both sides of the organ. This change has even extended to the aorta and pulmonary artery.—Since it was first noticed by J. P. FRANK, it has attracted much attention. The redness cannot be removed by washing, and hardly even by maceration. It has been ascribed to the imbibition of the colouring matter of the blood; but frequently no blood is found in contact with the coloured part. It evidently does not arise from congestion of the cavities of the heart previously to death, because it has been observed where no such occurrence has taken place further than is always attendant upon dissolution. It certainly is not owing to decomposition, either incipient or advanced, as no signs of this change have been detected in connection with it. That it is essentially dependent upon inflammation, is shown by its being very often attended—1st, by slight thickening and softening of the membrane itself; 2d, by that change in the connecting cellular tissue which permits this membrane to be more readily detached from the adjoining textures than in health; and, 3d, by the presence of the usual products of inflammation affecting serous surfaces. The circumstance of these products being frequently not found on the reddened or injected internal surface of this organ, is readily explained by the fact, that the lymph, the usual product of inflammation of serous membranes, being effused in a fluid state, is commonly carried away by the current of the circulation before it can coagulate on the inflamed surface. — Besides, *internal carditis* very often takes place in connection with that state of constitutional power which JOHN HUNTER very ably proved to be incapable of forming coagulable lymph. But this disease is not infrequently met with in a form which does not admit of doubt; and to that, more especially, I have now to direct attention; its more disputed states also coming under consideration in the sequel.

64. KREYSIG (*Ueber die Krankh. des Herzens*, 2d th. p. 125.) was the first to give a detailed *description* of *internal carditis*; but M. BOUILLAUD has very recently entered upon the subject much more fully than any of his predecessors. The frequency of the disease, especially in connection with articular rheumatism, will enable the practitioner to investigate its nature, and the phenomena it occasions in relation to the structural lesions which have been produced. This has been ably done by M. BOUILLAUD, who, although he is not the first, is certainly the best, writer on the subject. — Since 1820, my attention has been directed to internal carditis, in consequence of having then met with a remarkable case of it. (See *Lond. Med. Repos.* vol. xv. p. 26. 1821.) [In 1821, I was requested to see another case, which terminated fatally much more rapidly than the former. To both these I was called in consultation with other practitioners; and in both, as well as in a third that occurred the following year, *post mortem* examinations were made. I have since frequently observed this form of carditis; and my experience warrants the assertion, that a large proportion of the more obscure — or what were formerly considered the more obscure — affections of children, particularly those occurring in connection with affections of the joints, are either internal carditis, or this complaint associated with pericarditis.

65. *a. The alterations of the internal membrane of the heart, caused by inflammation of it*, vary with the intensity and duration of the morbid action. — (*a*) *At an early stage* — 1. *Redness* is one of the most common appearances. It varies from a scarlet tint to a reddish brown or violet hue; and may be limited to the valves, or extended to all the cavities, or even to the large vessels. The inflammatory nature of this redness has been disputed; but when it is attended by one or more of the following lesions, its nature then admits of no doubt. — 2. *Thickening* of the internal membrane, or endocardium, is a common attendant on inflammatory redness, when it has continued a few days, especially of that part reflected over the valves. — 3. *Softening* also sometimes is observed in this stage, but most frequently in the next; this change generally extending to the connecting cellular tissue. — 4. *Ulceration* is met with only in rare cases at this period; but instances of its occurrence are recorded by BOUILLAUD and others. — 5. *A puriform* or *albuminous exudation* also takes place; but rarely in such a manner as will admit of its demonstration. So great is the force and rapidity of the current of blood through the compartments of the heart, and so rapid the motions of their parietes, that the products of inflammation of their internal surface are swept away and mixed in the circulating mass. Nevertheless, portions of these secretions are occasionally found after acute endocarditis. Puriform matter has sometimes been seen inclosed in a coagulum, or concealed in the meshes of the muscular columns. Coagulated or albuminous lymph has been found in similar situations; but more frequently adherent to the valves, or to their margins, or tendons. Occasionally it appears like granulations on these parts. — 6. *Gangrene* has been supposed hardly ever to occur from carditis; but M. BOUILLAUD considers that the appearances observed in some of his cases warrant the inference that it may take place, although rarely in consequence of acute endocarditis; and I believe that it will supervene only when internal carditis attacks a cachectic habit of body, or when there is a septic tendency induced in the system by a depraved state of the circulating fluids and by impaired vital power. — 7. The *blood* is more or less affected by acute endocarditis. When the disease attacks a person whose blood has not been already materially vitiated, or whose

soft solids have not been materially affected, then it occasions a greater or less disposition of this fluid to coagulate, and gives rise to fibrinous concretions resembling those found in the bloodvessels after inflammations of their internal surfaces. These concretions, when formed in the heart, are colourless, elastic, glutinous, and adherent to the internal surfaces of the cavities, or interlaced between the fleshy columns and tendons of the valves, and resemble the buffy coat of the blood. They are manifestly produced by the lymph exuded by the inflamed internal surface of the organ, which, towards the close of life, forms the nucleus around which the fibrinous portions of the blood collect and concrete. — If, however, internal carditis occurs when the blood is already vitiated, and vital power is either much impaired or deteriorated, the fluid effused from the inflamed part will be incapable of coagulating itself, or of causing the coagulation of the blood — will be of a watery or sanious kind — and will instantly mix with the mass of blood, and further vitiate it; death soon taking place, with all the symptoms of adynamic or putro-adynamic fever.

66. *b.* The *second stage*, or the period intervening between the fifteenth and thirtieth day of the disease, is attended by other alterations. — 1. The inflamed membrane is more *thickened*, this change often extending to the connecting cellular tissue, and even to the fibrous textures, especially of the valves. — 2. The albuminous or fibrous exudations now pass from the amorphous to the organised state, and assume the appearances of *excrescences, vegetations, granulations, cellulo-fibrinous adhesions*, and of *sero-albuminous false membranes*. M. BOUILLAUD observes that the excrescences or granulations are most frequent on the valves, especially their free edges. He divides them into the *globular* or albuminous, and the *warty*. The former are soft, of a whitish, yellowish, or reddish hue, and easily detached; and originate in the organisation of adherent coagulable lymph, as observed to take place on the surface of other serous membranes. The warty excrescences are of a cartilaginous consistency and firmly attached. They are either distinct, or aggregated into groups presenting a cauliflower appearance; and vary in size from that of a millet-seed to that of a pea. Both these kinds of vegetations seldom exist alone, either on the valves or on the internal surface of the cavities; but are commonly attended by fibro-cartilaginous or calcareous induration of the valves; and when they are large, numerous, or aggregated, they necessarily occasion narrowing of the orifices, and an impediment to the action of the valves. — 3. *Adhesions* of the opposed surfaces of the internal membrane were first described by M. BOUILLAUD, who has adduced six cases in which he met with them. They are, however, rarely observed; for the force of the blood's circulation, and the movement of the parietes of the cavities and of the valves, prevent their formation, excepting at those places where these obstacles are the least, as between the less moveable parts of the valves, and the opposite surfaces of the ventricles. These adhesions disturb the regularity of the circulation, by preventing the valves from completely closing the orifices. Another species of adhesion is sometimes observed between the opposite margins of the valves in certain cases of narrowing of the orifices, which will be mentioned hereafter. — 4. *Organised false membranes* are also occasionally found covering a greater or less extent of the internal surface of the heart; and M. BOUILLAUD states, that he has seen these membranes consist of several superimposed layers. In place of these, small colourless patches, of from four to six lines in diameter, sometimes form on the endocardium, and may be removed, leaving it more opaque than natural. — In many cases, the supposed thickening of this tissue has been entirely owing to organised false membranes; but as often the endocardium is itself thickened, opaque, and its free surface unequal, somewhat wrinkled, and villous; this change extending, as stated above, to the connecting cellular tissue.

67. *c.* In the *third* or *chronic stage* of internal carditis, the cellulo-fibrous, the fibrous or fibro-cartilaginous, alterations or formations observed in the former stage are converted into the *cartilaginous, osseous*, or *calcareous state*. — 1. These latter productions sometimes consist of circumscribed points — occasionally of thin patches of the size of the finger nail or even larger — or more rarely of rounded masses. — The valves may be almost entirely changed into a cartilaginous or osseous structure; but the fibrous zone of the orifices, and the points of the valves, most frequently undergo this alteration. Between these morbid patches or incrustations, the spaces are either natural or simply thickened. — The *osseous formations* often reach a very considerable size, and assume very irregular shapes, and sometimes even penetrate deeply into the substance of the heart. — 2. The cartilaginous or osseous valves are variously altered. As long as these changes consist of simple points or laminæ of small extent, the thickened and more rigid valves may still perform their offices; but when these alterations become more extensive and complete, the valves can no longer fulfil their functions. In this stage they present various lesions, as to form. Sometimes, as shown by LAENNEC, BERTIN, and others, their margins, especially those of the aortic valves, are folded *in*, so as to give an *inverted* appearance; and occasionally they are folded back, forming what has been described by Dr. HODGKIN and others under the name of *retroversion*. They may also be too short, or too unyielding, or too small, to close their respective orifices; and the orifices, on the other hand, may be too large for the valves. In either case, these latter will be *insufficient* for their purposes. — The diseased valves are occasionally perforated, or torn or ruptured in different directions; and those of the aorta have been found so completely torn as to be nearly detached. Sometimes one set of valves only is affected; but more frequently, when one set is very severely altered, another is opaque, thickened, or otherwise changed in some degree. — 3. *Contraction* of the heart's orifices is amongst the most common and most serious consequences of the changes now being considered. It may be so extreme as not to admit the point of the little finger, or even a quill. The thickened and hardened valves sometimes adhere at their opposite margins, leaving a permanent opening of a roundish, oval, crescent, or slitlike form; which, in the case of the auriculo-

ventricular valve, resembles the glottis or the os tincæ, owing to the thickening of the margins, and projection into the cavity of the ventricle. The thickening and induration occasionally extend to the tendons or even to the muscular columns. The semilunar valves also often stand firm and convex, or rigid. These changes have been well described by Mr. **Adams** and M. **Bouillaud**. — Dr. **Elliotson** remarks that the valves of the pulmonary artery sometimes grow up so as to leave only a small round or triangular opening in their middle.

68. *d*. The inflammatory origin of the changes now described has been doubted by several pathologists, and even by **Laennec**; but it has been advocated by **Frank**, **Kreysig**, **Hildenbrand**, **Andral**, **Elliotson**, **Bouillaud**, **Latham**, **Watson**, and others. Osseous formations in the heart have been supposed to occur only in advanced age. **Bouillaud** states, that of 44 cases, 33 occurred in persons under fifty, and 19 out of these were observed in persons under thirty; one being only ten years, another seven, and a third ten months. I have met with this formation in two children, — one of seven, the other of ten years; and in both, the symptoms, and associated lesions observed on dissection, were obviously inflammatory. Indeed, the matter is put beyond dispute. — The *narrowing* of the orifices of the heart by chronic inflammation is, as remarked by a recent writer, very analogous to what takes place in other organs from this cause — as in the urethra, and lachrymal and biliary ducts, the pylorus, the rectum, &c.; and the hypertrophy of the heart which succeeds, may be compared to the thickening of the muscular coats of the bladder, stomach, and other hollow viscera, arising in such circumstances from the difficulty of expelling their contents owing to the obstruction. When inflammation attacks the internal surface of the heart, the parts of it about the boundaries of the cavities, and near the orifices, or covering them and the valves, are most liable to be affected, as commonly observed about the boundaries of other cavities and canals. — **Bichat** had noticed the greater frequency of the lesions just mentioned in the left, than in the right, side of the heart. The fact is undoubted. M. **Bertin** considered that inflammation and its consequences are more likely to be occasioned and maintained by the exciting properties of arterial blood, than by the inert venous blood returned to the right side of the heart. This, however, is not sufficient to explain the circumstance; for inflammations are more frequent in veins, than in arteries.

69. *B. Symptoms of Internal Carditis.* — *a.* In the *first or acute stage*, actual *pain* is seldom felt, unless the disease be associated with pericarditis or with pleuritis; but uneasiness, oppression, or anxiety, in the præcordia, with faintness, is always complained of. The *physical signs* require the closest attention. — 1. The præcordial region, in simple endocarditis, is shaken by the violence of the heart's action, the hand being forcibly resisted by the impulse when applied over this region. The pulsations are felt over a greater extent than natural, owing to the turgescence of the organ in an inflamed state; and a vibratory tremor, more or less marked, is also sometimes felt. — 2. *Percussion* furnishes a dull sound over a greater extent of surface than natural; from four to nine or twelve square inches. But, in order to distinguish this sound from that attending effusion into the pericardium, it is necessary to observe, that it coexists with a superficial, visible, and sensible pulsation of the heart; the beat being profound, and hardly visible or sensible in cases of pericarditis with effusion. — 3. *Auscultation* detects a bellows sound, which masks the two normal sounds, or one of them only. This sound is the louder, the stronger the action of the heart; and is also rougher, the greater the swelling of the valves, and the more abundant or concrete the exudation of lymph from the inflamed surface. Sometimes, when the palpitations are violent, a metallic sound isochronous with the systole of the ventricle is also heard. — 4. The *force* of the heart's contractions is changed both to the eye and to the touch, and the frequency equally affected, the pulse rising sometimes as high as 140 and 160, or even higher, in a minute, and becoming irregular, unequal, or intermittent. — 5. *Animal heat* is generally also increased, but not usually in proportion to the augmentation of the circulation. The arterial pulsations represent only the *frequency*, but not the *strength*, of the heart's action in this disease; for, whilst the contractions of the heart are energetic, the *pulse* is generally small, soft, and indistinct. This is owing to the obstacle opposed to the circulation by the swelling of the valves or orifices, or both; or by the fibrinous exudations formed around them; a smaller column of blood being thrown into the arterial trunks; hence, probably, arise the pallor, anxiety, jactitation, faintness, leipothymia, want of consciousness, &c., frequently also observed.

70. In general, the venous circulation is not materially disturbed in this stage of internal carditis; but when the above obstacles to the circulation through the orifices become considerable, dyspnœa, a bloated or livid appearance of the face, slight œdema of the extremities, and pulmonary or even cerebral congestion often supervene. In this case, the patient experiences the most distressing oppression, cannot lie down in bed, is watchful, restless, and subject to a constant jactitation. In the simple form of endocarditis, delirium seldom occurs; but temporary wandering of the mind, and sudden terror, or unconsciousness, are occasionally present when the dyspnœa is extreme. — The digestive functions, the secretions and excretions, are also more or less impaired; and in the more extreme states, cold sweats often break out.

71. The above symptoms appertain especially to the *acute form* of endocarditis, particularly when it is general. But when it is *partial*, or *sub-acute*, or *chronic*, the symptoms are not so prominently grouped; and it is, consequently, recognised with greater difficulty. An attentive observer, however, will seldom mistake it for any other disease, excepting pericarditis, with which it is very liable to be confounded, even by the most experienced. But the error is not material; for both diseases very often coexist, and the means of cure are the same in each. When pericarditis is attended by effusion, then it is readily distinguished from endocarditis by the circumstance mentioned above (§ 69.); but, when it gives rise merely to a pseudo-membranous exudation, a

diagnosis is formed between them with very great difficulty; the sounds, however, in this state of pericarditis, will be a tolerable guide to a correct inference.

72. *b. The symptoms of the second and third, or chronic, stages of internal carditis* have reference chiefly to the *structural changes* that have been induced. The disease may have terminated in resolution before advancing into these stages, the foregoing symptoms having disappeared. But, when it has been mistaken, or neglected, or imperfectly treated, it passes into these sub-acute and chronic states or stages; the inflammatory action gradually subsiding as to intensity, or passing into that slow or chronic form observed to produce similar changes in serous tissues to those which have been described (§ 66, 67.). — Of all the organic lesions consequent upon endocarditis, the different forms of *induration of the valves and contraction of the heart's orifices* are the most permanent; often continuing after the inflammatory action which produced them has disappeared, whether this action has been *acute, sub-acute*, or *chronic*.

73. *c.* The *symptoms* of induration of the valves and narrowing of the orifices are generally such as lead to the detection of these changes, as well as of the consecutive hypertrophy and dilatation. — 1. *Inspection* shows merely the extent, force, and rhythm of the pulsations. — 2. The *hand applied on the præcordial region* discovers a vibratory, or purring tremor, with irregularity, inequality, or intermissions of the heart's action; or a treble or quadruple movement, as well as the increased force and extent of the contractions. — 3. *Percussion* furnishes a dull sound to a greater extent than in health. — 4. *Auscultation* detects, during the contractions of the heart, a morbid sound, which is *blowing, filing, grating, rasping*, or *sawing*, as to its character, according to the resistance furnished by the diseased valves, to the degree of contraction of the orifices, to the capacity of the cavities, and to the strength of their parietes.—Each of these sounds may be either *double* or *single*: the former completely masking or replacing both the natural sounds; the latter, only one of them. The morbid sound varies in duration and intensity: it is sometimes sudden, short, abrupt, and jerk-like; in others, it is slow, prolonged, or drawn out. It is occasionally so loud as to be heard even at a short distance from the chest; and, in some cases, it is so slight as to be detected with difficulty. In a few instances of induration of the valves, the bellows sound assumes a sibillous character. — 5. *Pain* seldom attends the above lesion; but the patient complains of weight, or of uneasiness or embarrassment, at the præcordia; of palpitations, of sinking, or of faintness. The palpitations are excited by the least exertion or mental emotion; and are characterised by the increased force, and the remarkable frequency, of the pulsations, which may reach 160 beats or upwards in the minute.

74. When, therefore, either of the morbid sounds just mentioned is present at the præcordial region, with a vibratory or purring tremor, palpitations, an irregular, tumultuous, or intermittent action of the heart, it is in the highest degree probable, that induration of the valves, and narrowing of one or more of the orifices, exist — particularly if the disease is of some months' or years' duration. This inference amounts to certainty, when, with the above *local* signs, the following *general* or sympathetic phenomena are present, especially a small, weak, or vibratory pulse, which contrasts remarkably with the energetic actions of the heart; dilatation of the superficial veins, particularly of those near the heart, as the jugulars, &c.; sallowness or lividity of the countenance; symptoms of congestion of the lungs, brain, liver, and mucous surfaces; passive hæmorrhages from the lungs and mucous membranes; dyspnœa, shortness of breath, or sense of oppression or stuffing in the chest, increased on slight exertion; effusions of fluid into serous cavities, or into cellular parts, &c.; and cerebral derangement, as restlessness, watchfulness, frightful dreams, jactitation, laborious breathing, &c. Pulsations of the jugular veins, synchronous with the pulse, are observed when a reflux of a portion of the blood takes place from the right auricle, during the contraction of the right ventricle, owing to insufficiency of the tricuspid valve, either from alterations in itself, or from dilatation of the auriculo-ventricular orifice.

75. *d. The diagnostic symptoms of lesions of the different valves, and of narrowing of the different orifices of the heart*, have been stated with more confidence than truth, by some who have made the stethoscope an instrument of parade and charlatanry. In answer to the question — Can this diagnosis be established? M. BOUILLAUD justly answers, that it is more curious than useful. — There is no doubt of the morbid sound being loudest at a point the nearest to the diseased orifice; and upon this, much of the diagnostic evidence rests. But further proof is requisite. When the *pulse* is examined in connection with the action of the heart, it is generally more irregular, unequal, intermittent, and smaller, in narrowing of the *aortic orifice*, than in that of the *left auriculo-ventricular orifice*; and the vibratory tremor of the pulse in the large arteries, first noticed by CORVISART, is most remarkable in the former case. The maximum also of the intensity of the purring tremor in the præcordial region, as well as the maximum intensity of the morbid sound, corresponds with the contracted orifice. — M. BOUILLAUD considers that synchronism of the morbid sound with the ventricular systole or diastole, signifies nothing; but in this he is incorrect; his opinion being the consequence of his views respecting the source of the natural sounds of the heart. — Narrowing of the *orifices of the right side* is infinitely less frequent than that of the left orifices; and is indicated by the correspondence of the maximum of the morbid sound and of the purring tremor with the situation of these orifices, and by the distension and pulsation of the large veins, especially of the jugulars.

76. Dr. WILLIAMS has divided structural lesions of the valves and orifices of the heart into two kinds — the *obstructive* and *regurgitant*; according as they *impede* the current of blood in its proper direction, or permit its *reflux*. But some alterations are both obstructive and regurgitant, as they impair both the opening and the closing of the valves. — *a. Obstruction at the aortic orifice* is attended by a bellows sound which is superficial, and occasionally sibillous, about the middle or top of the sternum, or about the cartilages of the fifth and sixth left ribs, and

which masks or replaces the *first* natural sound, and occasionally extends to the carotids. The *second* natural sound is either weak or indistinct, when the aortic valves are much diseased, the pulse being remarkably small and weak. — Obstruction of this orifice generally causes enlargement of the heart.—When lesions of the aortic valves render them *insufficient*, and occasion a *reflux* current into the ventricle, a short whiffing sound replaces the *second* natural sound at the middle of the sternum; the second natural sound in the pulmonary valves still remaining audible to the right of the sternum. Insufficiency of the aortic valves gives rise to dilatation, with hypertrophy of the left ventricle.

77. *b. Obstruction at the left auriculo-ventricular orifice*, or obstructive disease of the *mitral valve*, may be attended by a morbid sound or murmur at the time of the second natural sound, owing to the resistance to the current during the refilling of the ventricle; the morbid sound, however, not replacing the second normal sound, as the action of the semilunar valves may still be perfect, but merely attending it, or masking it, when loud. This lesion is accompanied by a small, but strong or hard pulse. It usually occasions hypertrophy of the left ventricle, sometimes with diminution of its cavity, and dilatation of the left auricle. — *Insufficiency* of the mitral valves produces a morbid sound at the time of the first natural sound, that is most distinct at the left margin of the sternum, between the third or fourth ribs, or rather more to the left, or as far as the left nipple, or a little below it; and that does not extend to the arteries. The pulse is always irregular or intermittent. — This lesion commonly gives rise to hypertrophy of the left ventricle, with dilatation of the auricle.

78. *c. Lesions of the semilunar pulmonary valves* are very rarely observed. Obstruction in this situation occasions a morbid sound at the middle of the sternum, more superficial and whizzing than that caused by disease of the aortic valves (HOPE). The circumstances of the morbid sound being inaudible over the great arteries, as Dr. WILLIAMS observes, of its not affecting the pulse, and of its causing more marked signs of venous congestion and disease of the right side of the heart, are more to be depended upon, than the mere situation of the morbid sound, in the diagnosis of this alteration.

79. *d. Lesions of the tricuspid valve, and of the right auriculo-ventricular orifice*, are more common than those of the pulmonary valves; but less so than those of the mitral valve. They give rise to a deep blowing or filing sound, most distinct under the sternum at the juncture of the fourth rib. If the lesion *obstruct* the current of blood, the morbid sound will replace the *second* natural sound; but if it allow *regurgitation* into the auricle, the morbid sound will accompany the *first* sound; the regurgitation giving rise to pulsation in the jugular veins, and to dilatation of the right auricle, or ventricle, or of both.

80. *e. Adhesion of the auriculo-ventricular valves to the parietes of the heart*, according to M. BOUILLAUD, are attended by the symptoms of narrowing or contraction of the orifices, especially palpitations, the bellows sound, the purring tremor, dyspnœa, and venous congestions, with passive effusions; but are distinguished — 1st, by the more broad, less dry, and less rasping sound, than in narrowing; — 2d, by the less irregular, less unequal, and less intermittent pulsations of the heart; the purring tremor being more diffused, and less distinct, than in narrowing of the orifices; — 3d, by the pulse being less small, and the oppression at the præcordia, the venous congestions, and their consequences, being less remarkable than in the latter lesion.

81. *f. The diagnosis of thickening of the internal membrane of the heart*, whether this change depends upon a true hypertrophy of this tissue, or upon the organisation of a false membrane lining its surface, is frequently impossible. When the thickening extends to the valves, without any other lesion of them or of the orifices, a remarkable increase in the loudness of the sounds is produced — especially if the mitral valve is affected. When the valves, or the orifices, or the parietes of the compartments, are otherwise altered, as they most frequently are, contemporaneously with this change, the signs will have a particular reference to such alterations.

82. It is justly remarked, by Dr. WILLIAMS, that, when two or more of the preceding lesions are associated, the signs become complicated, and the obscurity of the case increased; for, unless the character and locality of the morbid sound be distinct, the more prominent may mask the others. When the sounds are different, one being filing or grating, and the other blowing, the difficulty is less, and the nature and position of each affection may be exactly indicated. Rasping, or sawing, sounds are very rarely produced by mere contractions, or by soft depositions, unless for a short time during increased action of the heart. When these sounds are permanent, they may be referred to cartilaginous or osseous deposits in or about some of the valves. Hypertrophy and dilatation often make the signs of diseased valves more evident, by augmenting the force of the current through the cavities, and rendering more distinct the place and order of the sounds.

ii. INFLAMMATION OF THE PERICARDIUM.

— SYN. *Carditis externa*, Author; *Pericarditis*, Auct. var.; *Carditis*, Sauvages, Vogel, &c.; *Inflammatio Cordis et Pericardii*, Senac; *Hertzbeutelentzüngdung*, Germ.; *Péricardite*, Fr.; *Inflammazion del Pericardio*, Ital.; *External Carditis, Inflammation of the Envelope of the Heart.*

83. CHARACT. — *Pain under the sternum, inclining to the left side and to the epigastrium, with tenderness on firm pressure in the latter situations; dyspnœa; anxiety, oppression, constriction, or tightness at the præcordia; great rapidity and irregularity of the heart's action, and of the pulse; inflammatory fever; and morbid sounds detected by percussion and auscultation.*

84. *A. History, &c.* — *Pericarditis* was first mentioned by AVENZOAR, who was himself attacked by it, and was cured by bloodletting; but, excepting the cursory notice taken of it by RONDELET, SALIUS DIVERSUS, and FORESTUS, little attention was directed to it, until BONET, HILDANUS, BERGER, MORGAGNI, and others, recorded cases illustrative of its morbid relations. Still more recently, our knowledge of its nature

and treatment has been much advanced, by the writings of CORVISART, BURNS, KREYSIG, LAENNEC, TESTA, BERTIN, ELLIOTSON, STOKES, and others; and by numerous memoirs, which have appeared in the transactions of medical societies, and in periodical works, and to many of which references are subjoined.

85. *B. Structural Lesions.* — *a. In the acute stage of pericarditis* — *α.* The earliest change is *redness* of the pericardium, from capillary injection. In some cases, particularly when death has taken place rapidly, the redness is not remarkable, probably owing to the recession of the blood from the capillaries after death. The increased vascularity is principally seated in the subjacent or connecting cellular tissue; and the redness is sometimes increased by the infiltration of minute quantities of blood into this tissue, or into the serous membrane itself, so as to give rise to ecchymoses, or red points, spots or patches, or streaks. The thickness, transparency, and consistence of the pericardium, seldom undergo great changes at an early period of the disease; yet this membrane is often thicker and more opaque, than in the healthy state. It is generally detached with greater ease from the surface of the heart, and its removal shows the injection and redness, or infiltration of the connecting cellular tissue. — The natural exhalation from the surface of the pericardium is either increased in quantity, or remarkably altered in kind, or both; the *accumulated effusion,* which thus results, constituting a principal part of the changes produced by the disease.

86. *β.* The *effusion* into the pericardium presents various states, and undergoes changes of much importance as respects the subsequent course of the disease. — 1st. The effused fluid usually coagulates, or separates, into a turbid or flocculent serum and a concrete or fibrinous false membrane, which is organisable, and commonly covers the free surface of the cardiac envelope. In some instances, the coagulation is more irregular, or presents a curdled appearance, without being disposed in a membranous form over the external surface of the organ. The more fluid part of the effusion is generally serous, but it is sometimes sanguineous or tinged by the escape of a portion of the colouring substance of the blood. Occasionally the effused matter consists chiefly of coagulable lymph disposed in the form of false membrane; but more frequently the membranous depositions are accompanied by a quantity of fluid varying from a few ounces to several pounds. M. LOUIS adduces a case in which it amounted to four pounds; and CORVISART another, in which the pericardium contained a still larger quantity of a sero-puriform fluid. — 2d. In some cases of pericarditis, the effused matter consists of a homogeneous, inodorous, and *well-digested pus,* of the consistence of cream, and of a greyish, yellowish, or greenish white hue. The quantity of this matter varies as much as that of the former, or sero-pseudo-membranous effusion. — Cases of pericarditis giving rise to a purulent effusion have been recorded by P. FRANK, HASENOEHRL, MONRO, STOERCK, STOLL, LIEUTAUD, SENAC, BAILLIE, CORVISART, LOUIS, BOUILLAUD, and several recent writers. — Instances in which the fluid presents a *sero-puriform* character are frequent.

87. *γ.* The *coagulated* or *fibrinous lymph* formed in acute pericarditis is sometimes found in amorphous masses; but it is most frequently disposed in a membranous form, covering the greater part, or even the whole, of the free surface of the pericardium, especially of that part reflected over the heart. This false membrane varies in thickness from a fraction of a line to several lines. The appearance of the free surface of this membranous exudation is generally peculiar. CORVISART compared it to the internal surface of the second stomach of a calf. Sometimes it resembles the surface of a pine-apple. Dr. HOPE remarks, that, when the layer is thin, its free surface is often pitted with small depressions at regular intervals, presenting the aspect of a fine reticulation; and that, when it is thick, the surface is divided into more spacious cells, often as large as a pea, and separated by coarser partitions. In most of the cases which I have examined, the surface either was shaggy, or hanging in numerous short shreds — the "*Cor hirsutum, villosum, tomentosum,*" of the older writers; or presented an appearance similar to that produced by pressing soft grease between two smooth plates and by forcibly separating them. In some preparations of my colleague Dr. SWEATMAN, these appearances are beautifully preserved, the membranous exudation in these having surrounded the whole of the heart. M. CRUVEILHIER and Dr. HOPE have delineated these changes in their pathological works. — In some instances, the effused lymph is arranged in transverse undulations, or it presents an indented or wrinkled form. It occasionally acquires a deeper hue, the older it becomes; or presents a deep brown or reddish brown colour, most probably derived from tha colouring matter of the blood which the effused fluid contained. — The more recent the membranous exudation, the more feeble is its *cohesion*; and the older it becomes, the greater is its tenacity and elasticity.

88. *δ.* The rapidity with which effusion takes place, in consequence of pericarditis, is often remarkable; and the celerity with which organisation commences in the coagulated lymph, is often equally great. This is most evident when the lymph agglutinates the opposing surfaces of the membrane. Many years ago, I demonstrated that, when coagulable lymph is effused on an inflamed serous surface, and is brought in contact with that portion of the surface directly opposite to it, inflammatory action is generally thereby excited in the latter situation, without having extended to it continuously from its former seat. In all such cases, the lymph acts as an irritant to the healthy surface opposite, and sooner or later induces inflammatory action and adhesions of the opposite parts. This always takes place when the pericardium is acutely inflamed, and when the quantity of the fluid effused is not too great to prevent adhesion from taking place.

89. *b. In the chronic stage or state of pericarditis,* the pericardium becomes thickened, or hypertrophied; but this change is most remarkable in the subjacent cellular tissue. The apparent thickening is also sometimes owing to a fine and dense false membrane so firmly adherent to the pericardium as to resemble it on a superficial view. In this state or stage of the disease, the

capillary vessels and larger branches are developed beyond their natural size. Sometimes, in addition to these changes, a quantity of puriform or sero-puriform matter is found in the pericardium; but more frequently a quantity of serum, either limpid, turbid, opaque, flocculent, or sanguineous, is met with. — *a*, The *coagulable lymph* effused in the acute state of the disease, generally undergoes various changes in the course of this stage. In its place there is sometimes only found cellular adhesions, general or partial, or merely simple bands stretching between the opposite surfaces. In other cases, organised false membranes cover a portion, or even the whole, of the surface, and present a whitish, milky, or opaline appearance, particularly when they are limited in extent. In all these cases, more or less fluid, such as just described, is also present. Partial or limited false membranes are seen not only on the surface of the heart, but frequently also on the parts of the large vessels covered by the pericardium, and especially over the root of the aorta. These membranes are usually cellulo-fibrous or fibrous; but, in the more chronic cases, they may assume the cartilaginous or even the osseous state. In a few instances, the heart has appeared as if more or less enveloped in an osseous shell. Sometimes these changes take place in the fibrous structure of the pericardium itself. Occasionally, in place of the morbid productions being disposed in the form of bands or membranes, they assume that of granulations, or excrescences.

90. *β*. The effused fluid and morbid productions in the pericardium are often attended by various changes in the *substance*, or in the *internal surface* and compartments, of the heart, generally resulting from the extension, the pre-existence, or the co-existence, of inflammatory action in these parts, especially in the endocardium. M. BOUILLAUD attributes much of the alteration presented by the substance of the organ in these cases to the compression which the matters in the pericardium exert, and to the consequent embarrassment of the heart's action. This is probably the case; but much is also owing to the consequences of associated inflammation of the internal surface of the organ; for, although this disease may commence in either surface, it seldom runs its course in a simple form, or without extending to the other, or even to other structures. However this may be, it is indisputable, that, in a very large proportion of cases of pericarditis, and especially in those which are chronic, more or less of the changes characterising, or resulting from, *internal carditis* (§ 66, 67.) are also observed, as well as many of those alterations which are yet to be considered. — M. BOUILLAUD has noticed *atrophy* of the heart as one of the changes consequent upon membranous productions and effusions in the pericardium. This change I have also remarked, as well as loss of the colour — an extreme paleness of the heart's substance. This latter change was observed in a case published by me in 1821. — But *hypertrophy*, &c., of one or more of the compartments of the organ is most frequently seen in connection with pericarditis. In some instances, *induration* and thickening of the pericardiac envelope extends from the subjacent cellular tissue to the muscular structure, or rather, perhaps, to the cellular tissue connecting the fibres; and these parts assume, in rare cases, a nearly cartilaginous state. — *Softening* attended by a dark or deep red colour (*brownish red softening*), or by loss of colour (*yellowish white softening*), of the substance of the heart, also is occasionally met with in pericarditis; the former most frequently in the acute state, the latter in the chronic. But these and still more remarkable changes are observed chiefly in cases of pericarditis associated with acute carditis (§ 109.). The coincidence of yellowish white softening of the substance of the organ with pericarditis was noticed by LAENNEC, and has been attributed by BOUILLAUD to the macerating effect of the serum contained in the pericardium. In a case of rheumatic pericarditis, readily recognised during life, this form of softening was observed by me on dissection; but there was scarcely any effusion, and there had been no evidence of much having existed at any period of the disease, although partial false membranes had formed. — In thirty-six cases in which M. LOUIS observed effusion in this disease, the fluid was sero-sanguineous in four, a turbid serum in nine, sero-puriform in fifteen, and purulent in seven. — According to my own observation, a turbid or flocculent serum is most frequently met with; a purulent matter being found chiefly in sub-acute and chronic cases, and independently of any ulceration. (See further, as to *Effusion of Fluid into the Pericardium*, the article, DROPSY OF THE CAVITIES OF THE CHEST, § 148. *et seq.*)

91. *γ*. The *external surface* of the pericardium is not always free from very decided marks of inflammatory action. — These marks are, however, found chiefly when pericarditis has been preceded, attended, or followed, by pleuritis, pleuro-pneumonia, or by inflammation of the superior surface of the diaphragm, or of the mediastinum. In cases of this kind, and perhaps also in others of great severity, or where the unattached sac has been principally affected, coagulated lymph is not infrequently found uniting the external surface of the pericardium to the pleura, a turbid serum being more or less abundantly effused into the pleural cavity. Whilst writing this article, I had an opportunity of examining, after death, a remarkable case of this kind; and another, presenting the same appearances, was brought into the dissecting-room of the Middlesex Hospital Medical School, whilst this sheet was about to go to press, the man having died suddenly.

92. *δ*. When pericarditis does not *terminate* in resolution, and in the absorption of whatever lymph has been effused, the next best termination that remains, as Dr. HOPE observes, is adhesion of the opposite surfaces; for, should this not take place, the false membrane becomes a secreting surface, effusing more and more fluid until the cavity is completely distended, and the action of the heart at last abolished. But, should adhesion take place, further effusion is thereby prevented, and life is often prolonged for many months, or even years; although adhesion occasions another form of organic change, which ultimately destroys the patient. — That adhesion occurs in one case and not in another, is entirely owing to the quality of the lymph, which depends upon the state of inflammatory action, and that, in its turn, upon the constitutional powers; for

the disposition to adhesion will be great in proportion to the abundance of coagulable lymph and scantiness of serous fluid effused, — a large quantity of watery, serous, or puriform fluid preventing adhesion from taking place.

93. The *process* of adhesion is very manifest. — When the more watery parts are absorbed, either the lymph on the opposite surfaces of the pericardium come in contact, as when the whole surface is inflamed, or that on the one surface comes in contact with the opposite part, excites inflammatory action in it (§ 88.), and a reciprocative effusion of lymph; both portions blending, thickening or coagulating, and gradually becoming organised. — As organisation commences and proceeds, blood-stains, straggling red lines, or pink-coloured vascularity, appear in the coagulated lymph, which now assumes more and more of a cellular or cellulo-fibrous character, and agglutinates more or less firmly and extensively the opposite parts. The more recent adhesions are generally thick, friable, and separable by tearing into two layers, one adhering to each surface of the pericardium; but those which are of longer standing are thinner and firmer, and consist of fine layers of dense cellular tissue. In some very old cases, this medium of adhesion becomes so thin as to be hardly perceptible, and the union so firm and intimate as not to admit of separation, thereby giving rise to the deception of the pericardium having been wanting.

94. It not infrequently happens, that, after the acute symptoms have been partially subdued, and the disease has continued for some months in a chronic state, false membranes, or adhesions, having been formed, the inflammation either recurs, or assumes a more acute state, and gives rise to an additional deposition of lymph, thereby thickening the adventitious membrane very remarkably. In these cases, the layers are successively redder as they are nearer the heart, and exhibit different degrees of consistence,—one layer or part being almost fluid or purulent, while another is cellular-fibrous, or semi-cartilaginous, or presents the density of tubercular induration. In these, changes in the substance of the heart, or in its internal surface, orifices, or valves, or in both orders of parts, similar to those already alluded to (§ 66, 67.), are generally also observed; and a fatal termination is seldom long deferred.

95. C. *Symptoms and Diagnosis of Pericarditis, and of its Consequences.* — Inflammation of the pericardium was considered by Laennec and several recent writers as the most difficult of the diseases of the heart to detect. This arose from too little attention having been paid to the rational symptoms attending it, and from the sounds occasioned by it having been imperfectly ascertained. The difficulty has been much exaggerated; for, of the numerous cases in which I have been consulted since 1818, some of which were published as early as 1821, the disease was detected during life in all but one, which I saw with Dr. Duffin. This case was complicated with other lesions, and terminated fatally a few hours afterwards; the constant vomiting and affection of the diaphragm having masked the symptoms indicative of pericarditis. That this disease is often overlooked, or confounded with inflammations of the pleura, lungs, diaphragm, &c., with which it is often complicated, cannot be doubted; and that it is, in its various grades of intensity and states of association, a much more common malady than has been supposed, is shown by the fact of M. Louis having found it in the proportion of one case in twenty in all the dissections he has made. This is still further proved by the circumstance of my having seen as many as four cases of the disease in one day: three of them in children under ten years of age, who were brought to my house, and who were examined also by Mr. H. Barker, the present house-surgeon to the North London Hospital, and then one of my pupils. On two occasions, I have met with the disease in two children of the same parents, and once in two brothers at the same time. — Although auscultation and percussion furnish some of the most important signs of pericarditis, and of its consequences, yet they must not be depended upon without carefully ascertaining the rational symptoms, local and general, and cautiously comparing and estimating all the phenomena observed.

96. *a. Symptoms of the acute or first stage.* — (*a*) The *local signs* of acute pericarditis consist — 1st, of altered *sensibility*; — 2d, of disordered *action*; — 3d, of change in *form*; — 4th, of morbid *sounds* heard on percussion and auscultation. — *a. Pain*, more or less acute, is very frequently complained of under the left nipple, extending to the lower extremity of the sternum, occupying sometimes the whole præcordia, irradiating thence to the left axilla, or arm, or to the diaphragm and epigastrium, or to the left hypochondrium. The pain is pungent, lancinating, tearing or violent; is often attended by a sense of compression and constriction, and by anxiety; and is increased on percussion, on a full respiration, on coughing, on holding the chest erect, and on lying on the left side. In many cases, however, the pain is dull, or so slight as to be little or not at all complained of; but if pressure be made upon the intercostal spaces, or upwards from the epigastrium towards the pericardium, more or less internal pain will be excited. Cases also occasionally, occur in which no pain is felt at the præcordia, and, consequently, where the existence of pain on pressure in these situations has been neither inquired after nor ascertained; and instances are not uncommon where the pain of pericarditis is masked by an associated acute pleuritis or severe articular rheumatism. I agree with Dr. Elliotson and Mr. Mayne in considering pain or tenderness, circumscribed in extent, and confined chiefly to the left side of the epigastrium, and felt most when pressure is directed upwards on the diaphragm and under the anterior margins of the left false ribs, as one of the most constant symptoms of pericarditis. — M. Bouillaud observes, that the more simple the disease, the more frequently is it latent, and in this he agrees with Laennec; that the same holds also in respect of rheumatismal pericarditis, which is often attended by little pain, when the adjoining pleura is unaffected; and that the pain is most severe when the costal pleura in the vicinity, and especially when the diaphragmatic pleura, is implicated.

97. *β.* The *pulsations of the heart* are stronger and more frequent than natural; sometimes regular, at other times irregular, tumultuous, unequal, or intermittent, with exacerbations of the

palpitations. The impulse is then readily felt by the hand, and perceived on inspection. But frequently it can be detected by neither, when copious effusion has taken place into the pericardium; and the palpitations present at the commencement, then disappear. In these cases, the actions of the heart are either really or apparently feebler than natural. M. BOUILLAUD states, that when the inflammation is passing into the formative action — when organisation is commencing in the effused lymph — the second movement of the heart seems double, or imparts a crepitating or crackling sensation to the hand.

98. γ. A more or less evident *prominence* of the præcordia, or of the cartilages of the left ribs, mentioned by M. LOUIS, is often observed, especially when the disease affects children. It depends either upon effusion into the pericardium and vascular swelling of the affected tissues, or upon inordinate action and consecutive hypertrophy. The concomitant signs, especially the states of pulsation and impulse, will readily disclose the cause of this appearance.

99. δ. *Percussion* furnishes a dull sound to an extent in proportion to the effusion, and at a period of the disease varying with the commencement and progress of this lesion. At first, or in that form of pericarditis called *dry*, but little effusion, or merely a thin membranous exudation of lymph, takes place; and the dulness on percussion is not much increased. Hence it is only when effusion is considerable that this means of investigation is of much assistance in this disease. When the fluid is not abundant, the position of the patient will also modify the extent or situation of the dull sound, or even prevent it from being remarked, owing to the gravitation of the liquid to the more depending part of the pericardium.

100. ε. *Auscultation* affords no sign that can be alone depended upon in the acute stage of pericarditis. The sound resembling the *creaking of new leather* is rarely heard in this period, but more frequently in the next. It was first noticed by M. COLLIN, and afterwards mentioned by me in the article AUSCULTATION (§ 41.), where I attempted to explain its occurrence. Dr. W. STOKES next treated of it in an able paper on this disease. I have already alluded to cases in which I have met with it, and one in which it was distinctly heard by the patient herself (§ 15.). In its true form, it rarely, or only temporarily, occurs. But a *friction sound*, which has been noticed by STOKES, MAYNE, WATSON, myself, and others, is frequently heard in this stage, or when little or no effusion exists; and closely resembles the friction, rubbing, or to-and-fro sound in pleuritis. In some cases, the rubbing sound resembles the rasping, grating, or sawing sound in induration of the valves, from which it must be distinguished, as well as from the bellows or blowing sound which is also often heard in pericarditis. When the rubbing sound assumes a grating or rasping character, and is thus liable to be mistaken for similar sounds caused by valvular disease, it will generally be found to arise from the rough surfaces of false membranes covering the surface of the pericardium. In these cases also, M. BOUILLAUD likens the friction sound to the rubbing together of taffeta or of parchment. This kind of rubbing sound is to be distinguished from the rasping or sawing sound caused by disease of the valves, by its being double, and more superficial and diffused than it. — The *bellows sound*, also, may be confounded with the more superficial and diffused rubbing or crushing sound; but a slight attention will detect the difference between them, arising from the circumstance just stated. This sound, in its different modifications of a filing, sawing, or rasping sound, is always *single* — is a rush, or whiz, as Dr. WATSON remarks, and is synchronous with the systole of the ventricles, and deep-seated; the *rubbing* or *friction* sound, in its different states, is a *double* sound, and suggests the idea of the rubbing together of the opposite surfaces of the pericardium, roughened by the exudation of lymph; it ceases when a copious effusion of serum takes place, or when the surfaces become adherent. Both these sounds are sometimes coexistent, especially when the internal and external membranes of the heart are inflamed at the same time; and they may be then severally ascertained by an experienced and careful observer. I have detected a bellows sound in the larger proportion of cases of pericarditis that I have seen in children. — The *rubbing* or *friction* (STOKES, MAYNE, BOUILLAUD), the *to-and-fro* (WATSON), the *crushing* (BOUILLAUD), and the *ascending* and *descending* (LAENNEC and REYNAUD), *sounds*, are either the same or slight modifications of the same phenomenon, — are heard chiefly in acute pericarditis, — are double sounds, although louder during the systole than during the diastole of the ventricles, — are caused by changes affecting the pericardium, — are not heard in all cases, and only in certain stages or states of the disease, — and depend upon different lesions from those which occasion the bellows, rasping, or sawing sounds. These latter proceed from alterations *within* the heart, the former from changes *external* to it. — The *creaking* or leather sound, according to my observation, occurs chiefly in the chronic stage of the disease; is a different sound from that of rubbing or friction; does not depend upon that cause, but upon thickening and induration of the pericardium reflected over the heart and of the connecting cellular tissue, or upon the existence of a dense or an elastic false membrane, as stated above (§ 15.).

101. When copious effusion has taken place into the pericardium, the natural sounds of the heart, as well as the morbid sounds arising from changes about the valves or in the orifices of the organ, will be heard more obscurely, or at a greater distance and deeper in the chest. — The pulsations will also be found unequal, irregular, intermittent, or laborious, not only on auscultation, but also upon applying the hand over the præcordia. — I have already imputed the bellows sound in pericarditis to changes in the valves and orifices of the heart — to alterations within the organ. This sound has been differently accounted for by Dr. HOPE and others. But it will be found (and Dr. WATSON and M. BOUILLAUD confirm the opinion) to proceed in every case from the cause now assigned; this cause itself resulting from internal carditis preceding, accompanying, or following the inflammation of the pericardium. In such cases, the internal carditis may be limited to the valves or

to the orifices, or may affect both, or may extend also to the surface of one or more of the cavities. When the affection of the internal parts is merely an extension of the inflammation from the pericardium to them, this limitation to the valves and orifices is the more likely to exist. It is manifest from this, that the recognition of the different sounds is of great importance in ascertaining the extent and association of inflammations of the heart.

102. (*b*) The *sympathetic or general symptoms*, when duly weighed, are of the utmost importance in pericarditis, and particularly when estimated in connection with the local and auscultatory signs; but they present the utmost diversity, arising from the intensity and complication of the disease. — *α*. In the acute state, a more or less violent *febrile commotion* is usually observed to follow chills or rigors. The *pulse* at the commencement is generally strong, full, quick, and hard; and the *skin* is hot, but perspirable. The pulse afterwards becomes unequal, oppressed, irregular, small and rapid, and often intermittent, especially at an advanced stage. Sometimes it presents more or less of these latter characters from the first; and the skin is then hot and unperspirable; but occasionally the extremities are cold, or are covered with a cold perspiration. More or less *anxiety* at the præcordia is complained of; and it generally increases, and is almost insupportable, causing extreme restlessness and agitation. *Dyspnœa*, an anxious respiration, and a feeling of overwhelming oppression, are also present, with frequent sighing, which gives momentary relief. If the adjoining pleura is implicated, respiration is hurried, short, and shallow, sometimes interrupted by broken sighs, or by deep catching inspirations. The patient has a sense of suffocation, of constriction, of internal heat, and of fulness in the præcordia, and towards the left side, occasionally accompanied, or alternating, with acute or lancinating pain or with jactitation. — *Cough* is not always present, unless the disease is associated with pleuro-pneumony or pleurisy, and it then has the characters usually observed in these diseases. *Blood* taken from a vein, especially when pericarditis is thus complicated, or when it is connected with acute or articular rheumatism, is cupped and very remarkably buffed, the coagulum being firm. The *pulse* commonly ranges from 120 to 150, and the respiration from 35 to 45, in a minute. *Watchfulness* is generally distressing; and, if the patient fall asleep, he suddenly awakes in a state of agitation and alarm. — The *countenance* is pale, anxious, constricted, and sunk; but it is sometimes, especially as the disease advances, equally pale or equally red; it is always expressive of distress and solicitude. Occasionally the muscles of the face are convulsed, or contracted so as to give rise to the *risus sardonicus*. Although strong palpitations are usually present, particularly in the early stage, they are seldom much complained of. The patient generally assumes the supine posture, or lies upon the right side with the head and shoulders considerably elevated. Most of the above symptoms are aggravated by motion, by compression of the chest, by turning on the left side, and by a high temperature. To these supervene, if the disease be not arrested in a very few days, singultus, sometimes temporary or slight delirium — more rarely maniacal excitement, or attacks of general convulsions. If the malady continue for several days, the face becomes pale, wan, turgid, or livid, and œdema of the extremities and other symptoms indicative of organic change of the heart are observed.

103. *β*. In acute pericarditis, other symptoms, much less constant than most of the above, are often observed; whilst others, which usually attend symptomatic inflammatory fever, as loss of appetite, thirst, loaded or foul tongue, costiveness, and scanty high-coloured urine, are seldom absent. *Vomiting* is an occasional symptom, and is observed chiefly in the most violent cases, and when pericarditis is *complicated* with inflammation of the diaphragmatic pleura. Indeed, the above violent state of constitutional commotion is most frequently seen in this complication, many of the symptoms depending more upon the latter than upon the former. *Hiccup*, delirium, and convulsive motions of the muscles of the face, are also more frequent when the disease is thus associated. The course of this complication is often rapid, and its termination fatal, when its nature is not recognised sufficiently early. When vomiting is urgent, and the pain in the epigastrium is severe, and accompanied by tenderness, the disease may be mistaken for gastritis; and the consequent singultus, and restlessness; the rapid, weak, and irregular pulse; cold sweats on the extremities, &c.; may be attributed to the unfavourable termination of this latter malady. In a case of this kind, which ended fatally in a few hours after medical aid was required, and which I saw only once, the disease was thus mistaken by me. But this occurred many years ago, and in circumstances which precluded a minute inquiry into the local signs.

104. *γ*. Many of the symptoms, also, especially the bellows sound; the rapid, weak, small tremulous, and irregular pulse; the tendency to syncope on motion; the disaccordance between the pulse at the wrist, and the actions and impulse of the heart as felt at the præcordia; the extreme anxiety and restlessness, &c.; may be referred chiefly to the co-existence of inflammation in the adjoining substance of the heart, or in the orifices and valves. Extreme or constant dyspnœa; the dulness on percussion; the weak and diffused impulse of the heart; the obscure or deep-seated sounds, &c.; the smallness, weakness, and irregularity of the pulse; the tumid, bloated, and livid state of the countenance; and the fulness of the jugular veins; are to be attributed chiefly to effusion into the pericardium and pleura, especially into the former. If faintness or syncope occur independently of motion, the pulse nearly disappearing, or becoming tremulous and intermittent, the formation of polypous concretions in the cavities of the heart may be suspected.

105. *δ*. In some uncomplicated cases, acute pericarditis has run its course without the constitutional symptoms having been at any time very severe; but in these, the anxiety, oppression, or constriction at the præcordia; the state of the heart's action, and of the circulation, especially the rapidity and irregularity of the pulse; will arrest the attention of the practitioner, and lead to a more minute examination of the local

signs. The more prominent symptoms of an associated pleurisy, or pleuro-pneumony, may mask those of pericarditis, or the one disease may be mistaken for the other; but as the treatment ought not to be thereby rendered more inert, the consequences will not be serious. When the attention is alive to this complication, and to the points of resemblance between these diseases, the distinguishing characters of each will be generally ascertained: inattention alone will mislead. Even in the most obscure cases of pericarditis, the recognition of one or two symptoms, that cannot fail of taking place, will generally lead to the detection of others which are pathognomonic, if they be properly inquired for; and pain or tenderness on pressure at the left side of the epigastrium, &c. (§ 96.), the morbid sounds discovered by percussion and auscultation, and the disordered state of the circulating and respiratory functions just mentioned, will indicate the nature of the malady. The more acute and fully developed states of pericarditis can be mistaken only for inflammation of the diaphragmatic and left pleura; but a careful observation of the local and general symptoms will readily show the difference between them, and detect them when associated with each other. The sole error that can take place in the diagnosis, when they are thus associated, is to recognise only one of them; but this will not affect the treatment, and not very materially the prognosis. The most serious mistakes are most likely to occur with respect to simple pericarditis, particularly when the local symptoms are slight; for it has occasionally happened that this disease has been found after death, although it was not suspected during the life of the patient. In this case, it is doubtful whether the error in diagnosis has been owing more to the latent nature of the malady, than to the inattention of the medical attendant.

106. ε. Pericarditis may, from the commencement, exist in a *slight* or *mild form*, when its detection is very difficult, and it is very liable to be neglected. It then generally assumes a *chronic state*. Owing to the absence of manifest local symptoms, to the slight febrile symptoms attending it, and to the patient's neglect of his ailments, it has also been termed *latent* or obscure. Yet the disease may exist in a slow or chronic form, and manifest evident signs of its nature, from its commencement; but this is comparatively rare. The chronic state may also be consequent upon the acute; especially when the latter has been too long neglected, or treated with too little decision, or when the patient's constitution or previous health has been impaired. If, owing to these latter circumstances especially, the inflammatory action has terminated in effusion or in suppuration, the chronic or sub-acute state will often follow, and will generally be indicated by the usual signs of effusion into the pericardium; by pain, however slight, and tenderness in the situations particularised above (§ 96.); by slow fever, characterised by exacerbations in the evening or after a meal; by a frequent, weak, and irregular pulse; by more or less weight, or oppression, or anxiety, at the præcordia; and by a bloated or livid countenance, œdema, &c.

107. (*c*) When *false membranes*, or *adhesions*, have formed in the course of *chronic pericarditis*, the symptoms are generally obscure, and the diagnosis difficult. The inflammatory action, which produced these changes, with the attendant symptoms, may have subsided, or may not have been clearly manifested at any time. Yet I have met with cases in which the existence of these alterations appeared evident; and chiefly from the following circumstances: — 1st. The history of the case, and of the symptoms referrible to the præcordial region, and to the functions of the heart, and of the adjoining organs; — 2d. The frequent connection of these symptoms with articular rheumatism; — 3d. The presence of a true creaking sound, or a sound resembling that produced by new leather; — 4th. An undulation or pulsation observable at the termination and to the left of the ensiform cartilage of the sternum, the upper and left part of the epigastrium being drawn inwards and upwards at each systole of the heart; a similar appearance being sometimes also observed in the intercostal spaces of the left floating ribs, particularly in thin persons; — and, 5th. A superficial and diffused scraping or rough friction sound heard upon auscultation.

108. The connection of the true *creaking sound* with thickening of the cardiac portion of the pericardium, or with a dense and elastic false membrane formed on its surface, has been already noticed (§ 100.). The undulation or *pulsation* in the situations just mentioned has been observed by me in two or three cases, and in the very remarkable instance above alluded to (§ 12.), where the lower part of the sternum and the anterior margins of the left lower ribs were drawn inwards, or towards the spine. The *scraping sound* occurs only when the productions on the surface of the pericardium have assumed an unequal, cartilaginous, or even an osseous form; and when the symptoms referrible to the heart have existed for a long time. But in most of the cases in which I have observed either organised false membranes or adhesions in the pericardium, disease of the valves or orifices, and other organic lesions of the organ, have also been present, as will be noticed in the sequel.

iii. Inflammation of the Structure of the Heart. — Syn. *Carditis*, *Carditis vera*, *Incandentia Cordis*, Auct. var.; *Inflammation of the Substance of the Heart*, *True Carditis*.

109. Charact.—*Acute fever, with burning pain or soreness in the cardiac region, with tenderness on pressure, particularly at the epigastrium; palpitations, tumultuous and very irregular actions and intermissions of the heart, succeeded by swoonings, &c.*

110. I have ventured to state the symptoms which seem most characteristic of inflammation of the substance of the heart, although the histories of cases, where this disease was the most unequivocally present, have very rarely been observed with any degree of precision; the local symptoms having been altogether overlooked. One of the most remarkable instances of carditis on record, as respects the appearances after death, conveys no information, as to the history of the disease, further than that it was obviously connected with articular rheumatism; so palpable a circumstance even as this having escaped the person who treated the case (*Med. Chirurg. Trans.* vol. vii. p. 319.). In true carditis, the cellular tissue connecting the other textures

seems to be principally affected. Some doubts, however, have been entertained as to the inflammation commencing in this tissue; but there is no reason that it should not originate in this, as in the other textures of the organ. It is very probable that it most frequently begins in either the internal or the external surface, and extends thence to the connecting cellular tissue, and to the whole parietes of one or more compartments of the organ. It may even commence both in the substance and in either of the surfaces simultaneously; it certainly is very rarely or never limited to the former; inflammation of the substance of the heart being always accompanied with pericarditis or with endocarditis, or even with both. — The appearances after death, as well as the symptoms, vary remarkably according to the intensity of the morbid action in relation to the constitutional powers, to the previous health of the patient, and to the extent to which the different compartments and constituent tissues of the organ are affected by it. — The consequences and terminations of the disease depend also upon the same circumstances.

111. *A. Structural Lesions in True Carditis.* — The earlier changes consequent upon inflammation of the substance of the heart very rarely come before the pathologist; and even the more remote are seldom observed. In all the cases adduced by Hildanus, Stoerck, Meckel, and Corvisart, the pericardium was also inflamed; but the state of the muscular structure of the organ has been very imperfectly described by them. — *a. Collections and infiltrations of pus* in the substance of the heart have been very rarely observed. In only two or three cases has the purulent matter been found encysted. In most instances, these collections seemed to have been consequent upon acute or sub-acute inflammation; the structure of the organ being of a reddish brown hue, softened, and injected. In other cases, especially when the matter was surrounded by a distinct cyst, the symptoms were less acute, and those referrible to the heart much less prominent, or altogether latent. In nearly all the instances where this product of inflammation was found, the surfaces, or the valves or orifices, also presented indications of their participation in the morbid action.*

112. *c. Gangrene* consequent upon true carditis has been noticed by Senac, Corvisart, Portal, Leroux, and Kennedy. It is manifestly a *post mortem* alteration, accelerated by a depraved habit of body. All the cases adduced by these writers show that the inflammation of the heart was preceded by serious constitutional disturbance, and by a morbid state of the circulating fluids, that had favoured the occurrence of this termination, which had taken place either at the moment of dissolution, or soon afterwards. M. Portal states that, when the muscular structure of the heart becomes gangrenous, it is softened and impregnated with an ichorous and greenish serum, and that it exhales a fœtid odour. He believes that it may even be the seat of a kind of dry gangrene, and adduces a case in support of this opinion: — A man, of about fifty, in the course of a periodic fever, experienced palpitations and other signs of cardiac disease. He died somewhat suddenly; and, on dissection, the substance of the heart was found to be remarkably soft, and friable. It exhaled a putrid odour, was easily torn, and was devoid of serum. — The instance adduced by Dr. Kennedy was characterised during life by previous cachexia; by burning heat at the præcordia, ushered in by rigors; by exhaustion, restlessness, and extreme anxiety; by dyspnœa and palpitations; by a small, hard, rapid, irregular, and, lastly, intermittent pulse; by a parched, rough, and black state of the tongue, mouth, and fauces; by leipothymia; and by other symptoms of putro-adynamia. *Eight hours* after death, the heart was found remarkably dark; its substance break-

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* 1. Corvisart (*Opus cit.* obs. 37.) adduces a case in which, after fever attended by dyspnœa, pain in the head, præcordia, and left thorax, with anxiety, a feeble, irregular, and intermittent pulse, and delirium, death took place on the seventh day. The pericardium was found distended by purulent matter, the structure of the heart being softened and infiltrated with a similar substance. — 2. In a very instructive case recorded by M. Raikem (*Bullet. de la Faculté*, l'an. 1809.), violent pain and anxiety in the cardiac region, palpitations, dyspnœa, and leipothymia, consequent upon rheumatism and rigors, were complained of. To these were added, a bloated and anxious countenance, distension of the jugular veins, small and frequent respiration, irregular and excited action of the heart, pain at the epigastrium, and vomitings, followed by delirium, and by death about the fourteenth day. The heart was found large and flabby. Signs of inflammatory action were observed in its left valves, and orifices. Its substance was of a reddish brown hue, injected, and contained three or four small collections of an opaque sanious pus. — 3. M. Simonet has recorded a case in which the disease was connected with rheumatism. When the patient was brought to the hospital, the action of the heart was tumultuous and extensive, the pulse contracted and irregular, the respiration difficult, and the extremities cold. Bloodletting was practised; but he died a few hours afterwards in a fit of syncope. Purulent collections were found in the substance of the heart, especially in the interventricular partition. The internal surface of the cavities was red in several places; the muscular structure being of a yellowish grey hue, softened, and torn with the least effort. (Bouillaud, *Op. cit.* p. 266.) — 4. Dr. Graves was consulted by a gentleman, fifty-five years of age, who had complained, for many months, of palpitations and dyspnœa, and more recently of anasarca. Severe pain and anxiety were felt at the region of the heart, the former darting over the chest. Dr. Graves detected hypertrophy and dilatation of the ventricles, with a loud bellows sound, the purring tremor, and a very irregular pulse; and inferred the presence of disease of the valves. The patient died suddenly a few weeks afterwards. There were found considerable effusions of serum in both pleural cavities, enlargement of the heart, and adhesion of it to the pericardium by bands of coagulable lymph, which were strong at the apex. At this situation, was discovered a cavity in the muscular structure, with a regularly defined wall, which contained about two ounces of pus. The parietes of both ventricles were greatly thickened. All the valves were more or less affected. The valves of the aorta were nearly altogether ossified. (*Lond. Med. and Surg. Journ.* vol. vii. p. 803.) — 5. In a case detailed by M. C. Broussais (*Annal. de la Méd. Physiol.* t. xxi. 1832.), the abscess in the substance of the heart was *encysted.* — A soldier, nineteen years of age, was attacked with small-pox, in the course of which abscesses, enormous infiltration of the left arm, probably caused by a consecutive phlebitis, &c., supervened. A constant fever, with anxiety, marasmus, &c., ultimately became the principal symptoms. He died on the fifty-fifth day from the attack. An abscess, of the size of a filbert, was found in the muscular substance of the left ventricle, near its base. The matter consisted of well digested pus, which was contained in a consistent cyst. — 6. M. Laennec found a similar abscess in the substance of the left ventricle of a child who died of pericarditis. A case resembling the foregoing is also recorded by Henning (Hufeland's *Journ. der Pract. Arzneyk.* b. vii. st. iv. p. 144.). Two cases are recorded by M. Marechal, in which purulent collections were formed in the cavities of the heart, connected with their internal surface, and surrounded by a thin friable membrane. The patients had experienced symptoms referrible to the heart during the latter days of existence. (*Journ. Hebdom. de Méd.* t. ii. p. 494.)

ing down, when pressed gently with the finger. It exhaled a putrid odour; no blood exuded from its vessels; and all its cavities were empty; the large thoracic and abdominal veins being loaded with black grumous blood.

113. *b. Softening* of the substance of the heart is one of the earliest alterations consequent upon inflammation of it; but softening, unconnected with vascular congestion and discolouration, cannot be altogether attributed to this state of morbid action. The *reddish brown softening* sometimes observed is manifestly owing to the most acute form of inflammation; the muscular substance of the heart being of a reddish, brownish, or livid hue, and the connecting cellular tissue injected or engorged with dark blood. Sometimes blood, of a very dark colour, and more or less altered, is found infiltrated between the muscular interstices, or underneath the serous membranes covering the internal and external surfaces of the organ; these membranes participating in the morbid action. In a case examined by Mr. STANLEY, the muscular fibres were found of a very dark colour, of a very soft and loose texture, and easily separated and torn by the fingers; the nutrient vessels being loaded with venous blood. A section of the ventricles presented numerous small collections of *dark-coloured pus* among the muscular fasciculi. Some of these were seated near to the cavity of the ventricle, while others were more superficial, and had elevated the reflected pericardium from the heart. The muscular fibres of the auricles were also softened, and loaded with dark blood.

114. *d.* M. BOUILLAUD has described two other varieties of softening of the heart, which he believes to arise from inflammation. In the one, the muscular structure is of a *whitish*, or *pale grey*, colour; in the other, it is of a *yellow* hue. —*Whitish* or *greyish* softening he supposes to be the second stage of the reddish brown softening; and to indicate a further advanced stage of carditis. That such is the case, appears partly proved by its connection in some instances with suppuration, or purulent infiltration of the muscular tissue of the organ, although attended by much less vascular injection and congestion, than the reddish brown softening. CORVISART remarks, that carditis renders, after a time, the muscular structure of the heart soft and pale; the fibres losing their cohesion, and the connecting cellular tissue becoming loose, or infiltrated by a lymphatico-puriform matter. The parietes of the heart are torn with the greatest ease, and are broken down with the least pressure. (*Op. cit.* p. 257.)

115. The *third* variety, or *yellowish* softening of LAENNEC and BOUILLAUD, often is manifestly connected with chronic true carditis, although by no means generally. It differs from the former (§ 114.) only in its yellow colour; and is most frequently greatest in the interventricular septum, and the centre of the muscular structure of the ventricles; the parts nearest the internal and external surfaces of the organ being less evidently changed, or presenting reddened points of the healthy consistence.—The second of these forms of softening was observed by me in a patient who died of the consequences of inflammation of the membranes of the spinal chord, many months after having experienced an attack of acute carditis, connected with articular rheumatism (see *Lond. Med. Repos.* vol. xv. p. 26.); and, judging from the appearances in that instance, this softening seemed to result from a change in the nutrition of the organ, consequent upon the antecedent inflammation of it. BOUILLAUD considers, that its frequent coincidence with purulent effusion into the pericardium, shows that it depends upon this latter circumstance. The juster inference would be, to impute both the change in the substance of the organ, and the morbid secretion from the pericardiac surface, to perverted vascular action, conjoined with impaired organic nervous power. That these are the true pathological conditions, is shown by the circumstances in which this, as well as the yellowish variety of softening, is found.—I have observed them both, — this latter variety especially,—where there had been no evidence of cardiac disease, either at any previous period, or in a chronic form; and particularly in cases of general cachexia, and of constitutional disease, attended by discolouration of the surface of the body, — by a bloodless, yellowish, or tallowy or waxy appearance of the integuments, — and by other signs of a poor and deficient state of the blood, consequent upon impaired organic nervous energy and assimilation, as generally seen in the advanced stages of local malignant or contaminating maladies.

116. *e. Ulceration of the heart* may arise from an abscess, encysted or non-encysted, having opened either into one of the cavities, or into the pericardium. In the former case, the purulent collection, and the subsequent secretion from the diseased part, mix with the blood; in the latter, they accumulate in the pericardiac cavity, and increase a pre-existent pericarditis. M. BOUILLAUD supposes that they may open both ways, and occasion *perforation* of one of the compartments of the organ. It is more probable that, after opening in one direction, the tissue surrounding the abscess gives way, owing to the loss of substance, and to the softening consequent upon this lesion. That many of the cases of *rupture* of the heart arise from this circumstance, will appear in the sequel. Ulcerations are generally observed in the internal surface, most commonly in that of the left ventricle. Inflammation having commenced in, or extended to, the connecting cellular tissue, and having given rise, at one or more points, to an effusion of a serous or puriform fluid sufficient to detach the internal membrane from its vascular connections, this membrane necessarily loses its vitality at these points, and yields before the matter underneath it. Erosion of the endocardium, followed by ulceration, and limited softening, &c. of the substance of the organ, is thus produced; the number, extent, and depth of the ulcers being various.

117. Ulceration, in its course through the substance of the heart, gives rise to changes analogous to those observed after ulceration of arteries. The thinned and softened portion of the parietes yields before the pressure made upon it by the column of blood, and a *sacculated aneurism*, or *tumour*, varying from the size of a filbert to that of a large orange, is formed,—its cavity, as in the case of other aneurisms, being often in a great measure filled with lamellated coagula. The aneurismal tumours, consequent upon ulcer-

ation, generally form adhesions between the opposed surfaces of the pericardium stretched over them, their rupture being thereby prevented. They have been found only in the left ventricle; and, according to M. BRESCHET, the summit of the ventricle is their sole seat; but M. REYNAUD has shown, by the analysis of thirteen cases, that seven are exceptions to this rule.

118. *f. Perforation* of the parietes of one of the compartments of the heart may occur in either of the ways above described: from ulceration consequent upon abscess; from simple ulceration following inflammatory action; or from ulceration attended by an aneurismal tumour. It seldom or never, perhaps, proceeds from the last of these, for the reason just assigned; and whenever it does take place in either of the former cases, rupture or laceration of the remaining inflamed and softened tissues in the seat of ulceration usually takes place. When the perforation is made into the pericardium, death occurs suddenly; but when it is seated in the interventricular septum, then an admixture of arterial with venous blood results, and life may be prolonged for some time. — Instances of perforation from ulceration have been recorded by RULLIER, ANDRAL, and others. M. MARUEJOULS met with this lesion in the left auricle.

119. *g. Induration* and *cartilaginous* and *osseous transformations* of the substance of the heart are doubtless amongst the more remote or chronic lesions consequent upon carditis. Simple *induration* varies in degree and situation, and is generally limited to, or is most remarkable in, a single compartment. It may be seated in the parietes of a ventricle, or in those of an auricle, or in the septa, or in the fleshy columns. CORVISART, LAENNEC, and BROUSSAIS have observed it to equal that of the shell of a nut. It is, however, most frequently characterised by a transformation into a *cartilaginous*, or an *osseous*, or *osseo-calcareous substance*, and limited to a portion only of a compartment. The connecting cellular tissue, especially that beneath either of the membranes, seems to be the original seat of this change, the muscular fibres being atrophied, from the pressure of the indurated, hypertrophied, or transformed cellular tissue connecting them. The cartilaginous and osseous degenerations of a portion of the substance of the heart, have been observed by MORGAGNI, HALLER, SENAC, CORVISART, BAILLIE, FILLING, RENAULDIN, BICHAT, BERTIN, and many others. They are, however, much more frequently met with in the pericardium. The most remarkable instance of ossification of the muscular structure of the heart is recorded by A. BURNS. In general, when ossific deposits are found in this latter situation, they seem to have only extended to it from either of the surfaces, especially the pericardiac; or rather from the cellular tissue subjacent to these surfaces, to that connecting the muscular fasciculi, which become atrophied as the osseous or cartilaginous change proceeds. This seems well illustrated by an interesting case recorded by Mr. SMITH (*Dublin Journ. of Med. Science*, vol. ix. p. 419.).

120. That the change of a portion of the substance of the organ into the cartilaginous or osseous states is actually the result of a form of chronic inflammatory action, seems to be proved by what is observed in connection with these lesions in other situations, and by the circumstances of their association with increased vascularity and swelling in hypertrophy of the parts in which they are seated, and of their occurrence after undoubted evidences of inflammation had been manifested. That the state of the circulating fluids may, however, be indirectly concerned in the production of these changes, as consequences of chronic inflammatory action, in preference to any other, is not improbable; the superabundance in the blood, owing to impaired eliminating function, of those substances or ultimate products of assimilation, which contribute to the formation of the morbid depositions in question, possibly favouring their supervention.

121. *B. The Symptoms and Diagnosis of true Carditis* are so little different from those of internal and external carditis, that nothing precise can be advanced under this head. The circumstance of inflammation of the substance of the heart occurring chiefly as a consequence, or as a complication, of inflammation of either or of both the surfaces, nearly precludes the possibility of distinguishing between it and them, or of ascertaining its existence when thus associated, more especially when the disease exists in a sub-acute or chronic form. This difficulty has been acknowledged by CORVISART, LAENNEC, and BOUILLAUD. M. LAENNEC very justly remarks, that there is not on record a single case of carditis, the symptoms and course of which have been accurately observed. M. BOUILLAUD states, that he has never met with a case of carditis uncomplicated with pericarditis or endocarditis. It has been supposed, that the dark softening of the structure of the heart, so very frequently observed after death from adynamic or putro-adynamic fevers, has been owing to the complication, or supervention, of inflammation of this organ. The uncommon frequency of the pulse in many of these cases has been considered as evidence of this; yet the slighter forms of simple endocarditis would give rise to the same symptoms; and these, very probably, not infrequently occur in the course of those fevers — modified, however, by the constitutional malady; although in general the heart's substance undergoes no further change from them than other organs. In the advanced stages, or near the termination of these diseases, the heart participates in the alterations which take place in muscular parts generally, and becomes more or less softened and discoloured. This change, however, is independent of inflammation, and is the consequence of extremely depressed vital power, and impaired cohesion of the soft solids (see FEVER, § 18. 102.), in connection with deterioration of the circulating fluids. This change of the substance of the heart is also not infrequent in cases where the blood has been altered by the absorption of morbid matters, or by the infectious operation of putrid and contaminating fluids and miasms. I have remarked it in the putro-adynamic, or liquescent form of remittent fever endemic in low marshy districts within the tropics, and in the more malignant states of puerperal fevers, especially those met with in crowded or ill-ventilated lying-in hospitals (see PUERPERAL DISEASES). Several writers on the plague state that they have observed it in fatal cases of that pestilence. I also have found it after death

from pestilential yellow fever; and in a slighter degree from pestilential cholera. (See art. PESTILENCES.)

122. *a.* Notwithstanding the difficulty of determining the existence of carditis, during the life of the patient, Drs. HEIM and KRAUSE believe that a diagnosis may be made in some instances; and, judging from two cases, in which I was consulted, and in which the opinion as to its nature was confirmed by the appearances observed after death, I nearly concur with them, especially if the disease exist in a very acute and fully developed form. In this case, the patient experiences a violent pain in the region of the heart, with anxiety, preceded or attended by rigors, chills, or tremblings of the whole frame. To these succeed increased heat about the præcordia, or in the trunk, whilst the extremities and face are cold, and the whole surface is covered by perspiration, which is cold on the extremities. The pain is concentrated in the situation of the heart, is lacerating or rending, accompanied by the utmost agitation and expression of anxiety and distress, sometimes by screams, and occasionally by general convulsions and swoonings. The patient feels every pulsation of the heart, rolls about to obtain ease, and presses his hand forcibly against the præcordia. The chest is elevated, the head thrown back, and the face and hands covered with cold sweats. There is great thirst, but drink is refused on its reaching the lips; and there is often loquacity, passing into delirium as the disease advances. If no vascular depletion has been practised, the pulsations are indistinct, or fluttering, or tumultuous. After bloodletting, the action of the heart becomes more developed; palpitations, attended by intense suffering, occasionally take place, and, at other times, syncope supervenes, or they both alternate. Immediately upon opening a vein, syncope or convulsions are apt to occur; but, upon placing the finger on the orifice till the patient recovers, the depletion can be carried to a great amount, with relief to all the symptoms. The pulse varies remarkably, but is generally unequal or irregular, and remarkably small and weak, or indistinct. There is neither cough nor expectoration, nor vomiting; but a frequent expression of pain and distress. The pain is increased by each contraction of the heart, so as to cause the patient to complain of palpitations, even when the impulse is not sensibly increased. If the disease is not soon arrested, constant jactitation, or tremor, recurring fits of syncope, delirium, and death, take place; or, in consequence of the association with it of inflammation of the internal or external membranes, and of the effusion of lymph, the phenomena, local and general, observed in the advanced stages of internal and external carditis, supervene and constitute the chief characteristics of the malady. When acute carditis is associated with either of the other varieties, or passes into them, then the local and physical signs proper to each will be detected accordingly on percussion and auscultation.

123. These are the most constant phenomena of acute carditis, according to the description of Dr. HEIM, and the history of two cases which fell under my observation. The seizure is generally sudden, and the disease reaches its acme about the third day. In one of my cases, death took place on the fourth day. The patient (who was attended also by Dr. WALSHMAN and another practitioner) was about fifty years of age, and of a full habit of body. In the spring of 1821, whilst labouring under an attack of rheumatism, he was recommended by some person to take a strong dose of croton oil. He took three drops, which produced violent purging and vomiting. The rheumatism suddenly ceased, and was speedily followed by the most distressing pain and anxiety in the region of the heart, and entirely confined to it. There was no morbid sound on auscultation, although nearly all the symptoms enumerated above were present. The patient was repeatedly bled, but extreme restlessness and jactitation appeared, and death by syncope soon afterwards took place. On dissection, the pericardium presented hardly any signs of inflammation; but the substance of the heart was inflamed, and portions of the internal surface more slightly. The alterations, however, were not so extensive as was anticipated; probably owing to the activity of the treatment, as medical aid was promptly procured and the disease at once recognised, and to the rapidity of the fatal termination. In the other case, which occurred more recently, and which was of longer duration, dark softening, as described above, was very remarkable, with the usual products of inflammation on both the internal and external membranes, particularly the latter.

124. *b. The consecutive alterations* on true carditis are even more occult than the acute stage of the disease itself. Indeed, as these alterations most frequently proceed from a sub-acute or chronic state of carditis, or from inflammation limited to one or two compartments of the organ, their greater obscurity is to be anticipated. When *abscess* or *ulceration* is followed by *perforation* or *rupture*, then sudden death takes place, unless the alteration occurs in the interventricular septum. But the symptoms attending these lesions, previously to their reaching a fatal extent, have not been ascertained; and it is doubtful whether or not they admit of being distinguished. It is necessary to this end, that cases of this kind should be carefully observed, and accurately described; but there is none on record possessed of either of these qualities. The same observations apply to the *sacculated dilatation* or *aneurism* of the heart (§ 117.), consequent upon ulceration or abscess. In none of the cases of it which have been published, was this lesion either discovered or suspected during life. M. BRESCHET mentions only the signs that may be expected to occur, not those which have been actually observed; and M. BOUILLAUD advances no further. In the case detailed by M. REYNAUD, an affection of the heart was never indicated, the patient having died of a severe nervous disease, caused by the oxyde of lead, in a manufactory where he wrought; and the cases adduced by the authors referred to hereafter furnish quite as little information.

125. *c. Softening* of the heart, consequent upon various grades of inflammatory action, is indicated by a few symptoms, which, when duly weighed in connection with the previous history of the case, may lead the acute physician to presume its existence with some truth. These symptoms, however, taken by themselves, often attend other diseases characterised by extreme

asthenia, and even the asthenic functional disorders of this organ (§ 39.). But when, after more or less acute or sub-acute symptoms referrible to the præcordia, especially if attended by any of the morbid sounds, or other physical signs observed in external or internal carditis, or after dyspnœa, &c., the impulse of the heart at the præcordia, and the pulse at the wrist, become obscure, weak, and irregular; the latter being small or indistinct, the face livid or tumid, and the extremities œdematous, the dyspnœa increased or more constant; and when fainting or syncope occur frequently, or from very slight causes — then softening of the muscular structure of the heart may be presumed. Still all these symptoms may depend upon effusion into the pericardium, which, however, is often associated with softening of the organ. But a careful examination of the chest by percussion and auscultation, and the diagnostic symptoms adduced in the article on DROPSY OF THE PERICARDIUM (§ 151.) will often lead to a just conclusion. The softening of the heart, which, in a slighter degree, may be presumed to exist during convalescence from low or malignant fevers, is generally attended by a small and quick pulse, by a very weak and limited impulse, and by frequent returns of faintness or syncope. In the softening observed in very old people, the pulse is often slow, feeble, indistinct, or intermittent, or irregular; and dyspnœa, with many of the symptoms just mentioned, is generally present.

126. iv. *Of the* CAUSES *and Developement of Inflammations of the Heart and Pericardium.* — Inflammations of the *surfaces and substance of the heart* arise from the same *predisposing* and *exciting causes.* When either of these forms of carditis proceeds directly from these causes, or independently of a pre-existing malady, it has been denominated *primary* or *idiopathic;* but when it has followed another disease, and when a connection can be traced between both, it has been called *consecutive* or *symptomatic*. The *causes* already adduced, under the heads of *predisposing* (§ 18.), and *exciting* (§ 19.) are principally concerned in the production of the primary states of these inflammations. Some of those which have been termed *pathological* (§ 20.) chiefly occasion the consecutive forms of carditis.

127. *A.* Of the *predisposing causes* (§ 18.) already stated, plethora, the rheumatic and arthritic diathesis, the irritable and sanguineous temperaments, hereditary constitution, mental emotions, and early age, seem to be most concerned in producing inflammations of the heart and pericardium. Although these diseases may occur at any âge, yet they are most frequently met with between the ages of six and thirty-five. M. BOUILLAUD assigns the period between ten and thirty as that of their most common occurrence. I have, however, observed a large proportion of cases between five and ten years of age, and after thirty. I agree with him in considering them most frequent at those seasons when the vicissitudes of temperature and season are the greatest; and I may add, during spring, when north-east winds are most prevalent.

128. *B.* The *exciting causes* (§ 19.) comprise nearly all those just referred to; especially the mechanical, the traumatic, the physical, and the moral, exciting causes.— Of the *physical* causes, the most common are — exposure to cold when the body is perspiring, or after it has been much overheated or excited, and wearing damp clothes or sleeping in damp sheets or beds. The impression of cold after the copious transpiration and exhaustion caused by bodily or mental exertion, or by both conjoined, is very apt not only to produce inflammation of either of the surfaces of the heart, but also to occasion pneumonia or pleuritis to be associated with it. A young man of talent, after addressing a meeting under great mental excitement for upwards of an hour, exposed himself immediately to a cold easterly wind in the month of March; and was soon afterwards seized with pericarditis, complicated with pleuritis of the left side. A middle-aged man, after great muscular exertion and fatigue, allowed himself to be suddenly chilled: he was afterwards attacked by internal carditis, which soon became associated with pericarditis. The dangerous and often fatal consequences of violent or prolonged exertions in working the pumps of leaky or sinking vessels, are generally owing to the production of this malady in its most acute form. Of the truth of this, the author had, many years ago, a painful opportunity of assuring himself. The *moral causes* enumerated above (§ 19. (*c*)), and in the article DISEASE (§ 53.), sometimes either induce, or concur with other causes in occasioning, one or other of the forms of carditis.

129. *C.* The pathological states which have been adduced (§ 20.), are by much the most common causes of inflammation of the internal and external surfaces of the heart; and of these the most frequently observed is *rheumatism*, particularly the *acute articular form* of that disease. Internal or external carditis may be connected with rheumatism in *three* modes: — 1st. The cardiac inflammation may follow the disappearance, or suppression, of the rheumatic affection, and may thus appear as a *metastasis*, or translation of this affection; — 2d. It may take place before the rheumatic disorder has ceased in an extremity or external part of the body; and co-exist with this disorder in one or more joints, or in these situations, the external affection being, however, much less severe after the developement of the cardiac malady; — 3d. Rheumatism may extend itself to the heart or pericardium, without abatement in its external seat, or may affect, almost simultaneously, one or more joints and the heart; or a very acute arthritic rheumatism may mask a sub-acute internal or external carditis. Of these three modes of connection, the first and second are the most frequent; but the third is by no means rare. I believe that the more acute the rheumatic complaint, and the more it affects the joints, the greater is the risk of its occasioning carditis or pericarditis; the risk being also greater, the younger the patient: and I am moreover of opinion, that this connection between inflammations of the heart and rheumatism is much more frequent at the present day, than twenty years ago. Twenty-three years since, when I published a dissertation on rheumatism, and had my attention as alive to this circumstance as now, and with equal opportunities of meeting with it in public institutions, it was much less frequently observed. The modes of ascertaining it have certainly been improved

since then; but nearly as much now is often lost by inattention to the physiological or rational symptoms, as is gained by ascertaining the physical signs. Besides, as I have always resorted to auscultation and percussion since 1819, when I frequently accompanied LAENNEC in his rounds, the disease was almost as likely to have been detected by me then as now.

130. The next most frequent pathological conditions whence carditis, especially external carditis, may proceed, are *pleurisy* and *pleuro-pneumony*. The former disease may occur in consequence of the extension of the latter; or they may both appear almost simultaneously. I have even seen pericarditis give rise to, or followed by, pleuritis. Inflammations of the heart, thus associated, are most commonly caused by some one of the numerous modes in which cold is applied to the surface — or rather in which the animal caloric is carried off — when the body is perspiring, especially after exertion or fatigue, and in the rheumatic diathesis. — *Gout* is also sometimes a cause of carditis; and, I think, of the internal form of the disease, in preference to pericarditis. Internal carditis occasionally appears at an advanced stage of, or during convalescence from, either of the eruptive fevers. It, as well as other forms of the disease, may also follow other fevers, and the complaints mentioned above (§ 20.).

131. v. *The* DIAGNOSIS *of Inflammations of the Heart*, may be inferred from the description I have given of the symptoms attending each of the varieties; but as these varieties are often associated with each other, or in some measure pass into one another, as the inflammatory action predominates more or less in one of the constituent tissues of the organ, so the symptoms will vary in different cases, and even in different periods of the same case. Attention, however, to the following circumstances, and groups of morbid phenomena, will generally enable the practitioner to arrive at a tolerably just conclusion as to the nature of the disease: — 1st. The situation of the pain, in the more acute cases, and the tenderness, soreness, or pain on pressure felt in the left and upper part of the epigastrium, and in the left anterior intercostal spaces; — 2d. The increase of pain on stretching upwards or backwards, and the inability to lie on the left side; — 3d. The frequent extension of pain to the left axilla, shoulder, or arm, and the occasional numbness of the latter; — 4th. The greatness of the anxiety in proportion to the cough; the anxious, haggard, or peculiar expression of countenance; and the bloated or livid appearance of the face at a more advanced stage; — 5th. The state of the pulse at the wrist examined in connection with the actions and impulse of the heart; the great frequency and irregularity of the latter, and the smallness, weakness, &c. of the former; — 6th. The palpitations and tendency to syncope, or the alternation of these symptoms, and their connection with pain, anxiety, dyspnœa, restlessness, or jactitation; — 7th. The signs on percussion and auscultation, especially the *single bellows* or *blowing sound*, with all its modifications; and the *double friction*, rubbing and creaking sounds: the former having reference to changes within the *heart;* the latter to alterations within the *pericardium.*

132. vi. *The* COMPLICATIONS *of Inflammations of the Heart* have been already noticed in general terms (§ 32.). Inflammation of the *internal membrane,* whether acute, sub-acute, or chronic, is often associated with, or gives rise to, *pericarditis*, at an early period of its progress; but this latter is much more frequently complicated with, or occasions, the former. Signs of endocarditis are more commonly and more early detected in the course of pericarditis, than those of pericarditis are in the course of endocarditis; and both may be further associated with inflammation of the cellular tissue or substance of the heart, or *true carditis,* in various degrees, or to a greater or less extent, as respects the different compartments of the organ. — *A. Internal carditis* is much more commonly observed in a complicated than in a simple state, especially when it is at all advanced. It presents itself in connection with the following diseases and probably in a ratio of frequency approaching the order in which I am about to enumerate them: — 1st. With pericarditis and articular rheumatism; — 2d. With pericarditis only; — 3d. With rheumatism only; — 4th. With pneumonia, pertussis, and pleuritis; — 5th. With inflammation of the bloodvessels, especially phlebitis; — 6th. With eruptive, or adynamic fevers; — 7th. With purulent collections or caries in distant parts. Internal carditis, when associated with rheumatism or with pulmonary or pleuritic diseases, is generally also connected with pericarditis; but when it supervenes in the course of phlebitis, or of fever, or from some cause which contaminates the circulating fluids, then it is generally unconnected with pericarditis, although the substance of the heart may be more or less implicated, or even softened.

133. *B. Pericarditis* is also much more frequently met with, even in its early stages, in a complicated than in a simple form — generally in connection — 1st. With internal carditis, either acute or chronic; — 2d. With articular rheumatism; — 3d. With both internal carditis and rheumatism; this being oftenest observed; — 4th. With pleuritis, either pulmonary, diaphragmatic, or costal; — 5th. With pleuro-pneumony; — 6th. With inflammation of the diaphragm or mediastinum; — 7th. With true carditis; — 8th. With peritonitis; — 9th. With inflammation of some one of the abdominal viscera; — and, 10th. With eruptive fevers. Two or more even of these complications may exist in the same case, especially internal and external carditis, pleuritis and articular rheumatism; pericarditis, diaphragmitis, and pneumonia, &c. A body was lately brought into the dissecting-room of the Middlesex Hospital medical school, in which the liver was found inflamed and enlarged. It had formed adhesions with the diaphragm on one side, and with the adjoining viscera on the other. Between these viscera and the concave surface of the liver, the adhesions formed a large sac containing a turbid serum. The *pericardium* and diaphragm were inflamed, as well as the pleura on both sides. The pericardium and pleural cavities contained much turbid thick serum. — When pericarditis is associated with peritonitis or with inflammation of some of the abdominal viscera, the additional complication of pleuritis, especially diaphragmatic pleuritis of the same side, is not infrequent. BOUILLAUD adduces an instance of splenitis, diaphragmatic

pleuritis of the left side, and pericarditis, in the same patient. The opinion of CORVISART, that acute pericarditis rarely or never exists without being complicated, in some period or other of its course, is very nearly if not altogether true. — *C.* Of the complication of *true carditis* little further need be added. It can hardly exist without more or less inflammation of one or both surfaces of the heart; and in the few cases of it that have been observed, several were also connected with rheumatism, with pleuro-pneumony, with eruptive and other fevers, with phlebitis, and with purulent or sanious matters absorbed into the circulation.

134. vii. *Of the* PROGRESS, *Duration, and Terminations of Inflammations af the Heart.* — *A.* — *a. Internal carditis* may be *acute, sub-acute,* or *chronic,* and all the intermediate degrees. The most acute form may, especially from the effects of treatment, assume a mild and very chronic state; and this latter state may acquire greater activity, and become much more severe or acute. This latter change is, however, less frequent than the former. Where an amelioration has taken place, a recurrence or exasperation of the acute symptoms is very apt to occur. The most acute cases, M. BOUILLAUD observed, arose from sudden chills whilst the body was perspiring, chiefly in persons of the lymphatico-sanguine temperament, and employed in laborious occupations; hot stimulating liquors, taken with the view of recalling the perspiration to the surface, having assisted in developing the disease. When the less severe cases appear in connection with rheumatism, as they often do, in one or other of the modes above stated (§ 129.), a stimulating treatment of the latter disease renders much more acute the cardiac affection.

135. *b.* The *duration* of endocarditis is most indefinite, and altogether dependent upon the severity of the disease, the habit of body, age, strength, and constitution of the patient, the nature of the complication, the mode of treatment, and the period of recourse to it. — *Acute endocarditis* may terminate fatally in two or three days; and in this case, death is caused chiefly by the formation of fibrinous concretions, or coagula, in the cavities of the heart. When complicated with pericarditis, or with pleuro-pneumony, its duration will generally accord with that observed in these diseases. — The slighter or more *chronic forms* of internal carditis are of long duration, the more concealed states being prolonged indefinitely, or even for years; and organic lesions, especially of the valves and orifices of the organ, are usually the result at more or less early periods of their course. The inflammatory action either subsides or entirely ceases, after having produced these lesions, or it still continues in an obscure form. In the former case, especially when the amelioration proceeds from judicious treatment and regimen, the disease may remain, even for years, either stationary or more or less mitigated; but, in the latter, it generally advances with varying degrees of rapidity, until the functions of the organ and of the adjoining viscera are more or less impeded, or altogether interrupted; or until fatal congestions take place in vital parts, or dangerous effusions of blood or of serum supervene in important organs, or from mucous or serous surfaces.

136. *B.* — *a* The *progress* and *duration* of *pericarditis* also vary with the causes which occasion the attack, with the age, temperament, and habit of body of the patient; and with the morbid connections and treatment of the disease. — The most *acute form* may terminate fatally with great rapidity. M. ANDRAL records a case which was fatal in twenty-seven hours. The celebrated MIRABEAU was carried off by it so rapidly as to lead to the suspicion of his having been poisoned: he was only improperly treated, although in the usual manner at that time in France. Such violent cases are generally complicated, either with internal carditis, or with pleuritis, diaphragmatis, &c.; or with two or even more of these inflammations (§ 133.). The more moderate or favourable cases, however, generally terminate about the seventh or ninth days, or between the seventh and fourteenth. But there are exceptions to this. — The slighter and more *chronic grades* of pericarditis may continue for some months; and the consequences, particularly adhesions, connecting the pericardium, partially or generally, to the surface of the heart, may remain much longer, or for years; and, in some cases, especially when these lesions are slight, without materially disturbing the health. These adhesions are frequently attended by increased redness of the membrane, and by a little turbid serum, unless when they have obliterated all remains of the cavity. BERTIN, ELLIOTSON, and BOUILLAUD, believe that they do not occasion, even when general, any inconvenience beyond what proceeds from other co-existent lesions. But this is too favourable a view. They assist in developing, if they be not already associated with, still more serious alterations of the heart; and these latter frequently occasion other changes, either in collatitious or remote organs, more especially serous or sanguineous effusions; and thereby greatly abridge the period of existence.

137. viii. *The* PROGNOSIS *of Inflammations of the Heart* ought to be given with caution, generally with reservations, even when the most favourable circumstances are present. — *A.* In *endocarditis,* in its more severe states, there is always more or less danger; and the danger becomes extreme when the anxiety is very great, when the pulse is very frequent and irregular, and when swoonings or cold perspirations supervene. The slighter or more *chronic states* of the disease might be amenable to treatment, if it were possible to ascertain their presence, before they produce lesions which are but little under the control of medicine. But where these exist, in a manifest degree, the prognosis becomes unfavourable in proportion as they oppose the circulation through the compartments of the heart; death being the ultimate result, although it may be long deferred, and various intermediate changes may occur.

138. *B. Pericarditis* is always a dangerous malady; yet a considerable proportion of the cases will recover, if their nature be early recognised, and if an appropriate treatment be prescribed. M. LOUIS considers that perfect or partial recovery — partial, inasmuch as organic change of some kind remains, particularly adhesions of the pericardium to the heart — occurs in five cases out of six. If, however, the disease,

whether acute, sub-acute, or chronic, has given rise to effusion, an unfavourable opinion ought to be entertained of it, and especially if the patient be far advanced in life, or of a cachectic habit of body. Whether the effusion be puriform, or sero-sanguineous, or pseudo-membranous, or sero-albuminous, the question is chiefly as to the length of time that may elapse before a fatal issue takes place; much depending upon the symptoms and signs indicative of the amount of effusion, upon the states of the pulse and of the respiration, and upon the age and vital energies of the patient. When the effusion follows rapidly upon an acute attack, especially if there has been great frequency of pulse, and depressed constitutional powers, the danger becomes much more impending, than when effusion takes place more slowly and to a less amount. If pericarditis be associated with endocarditis, as indicated by the bellows sound, or by any of its modifications, or with pleuritis, pleuro-pneumony, or diaphragmitis, the danger is thereby increased very greatly — and increased in proportion to the intensity or extent of these inflammations. When the sub-acute or chronic disease has given rise, at more advanced periods, to adhesions, or to false membranes (§ 107.), the actions of the heart and diaphragm may be much disordered, and the functions of respiration, and of circulation in related or remote parts, greatly disturbed; but these consequences are not always observed. Patients have lived for years without much disorder being complained of; although more frequently these functions, particularly the latter, are more or less deranged — impeded circulation, or effusion into some cavity or organ, sooner or later taking place.

139. *C.* Of the prognosis of *true carditis* it is unnecessary to speak. If it be presumed to exist, the opinion of the result should be unfavourable, inasmuch as a degree of inflammation of the substance of the heart so intense as to be recognisable, generally induces the most serious changes either on one of the surfaces, or in the structure of the organ. If the symptoms of *softening* of the heart (§ 125.) be such as to admit of recognition, with any degree of confidence, the prognosis is extremely unfavourable, unless this lesion have taken place in fever, when a more favourable opinion may be entertained; recovery sometimes taking place during an energetic recourse to tonics, chalybeates, change of air, &c. The other consequences of carditis need not be noticed at this place, as they rarely admit of recognition during the life of patient.

140. ix. TREATMENT OF INFLAMMATIONS OF THE HEART. — The different forms of carditis require very nearly the same means of cure, the chief modifications consisting in the extent to which vascular depletions should be carried, in the various circumstances that usually present themselves; and in the choice of additional agents for averting the more serious changes, which are apt to take place. — *A. Bloodletting* is necessary in the three varieties of carditis, and especially when either of them is associated with pleuritis, or pleuro-pneumony; but the utmost discrimination should be exercised as to its amount and repetitions. In all cases, it should be employed early in the disease, and the quantity of blood taken away ought to be in due relation to the violence of the attack, to the age and constitution of the patient, and to the effects produced. In general, vascular depletion may be carried further in *pericarditis*, than in internal carditis, and in the complicated, than in the simple disease. The practitioner ought not to be deterred from bleeding by the weakness and smallness, or irregularity of the pulse, or by the faintness complained of; nor induced to carry it too far, by the palpitations, and inordinate impulse of the heart, and by the cupped and buffed state of the blood. If carditis be connected with rheumatism, this state of the coagulum will continue, although depletion be carried to inanition. I have seen it greatest in the blood last taken, where I was confident that the depletion had been carried to a very dangerous length. In these cases, the disease is partly in the blood itself; there is a redundancy of fibrine and albumen, and an increased disposition to their coagulation.

141. *B. Internal carditis,* unless when associated with pericarditis, is not so much benefited by very large bloodlettings, as may be supposed, although decided depletion, especially early in the disease, is required. M. BOUILLAUD thinks that this treatment should be carried further in endocarditis, than in pericarditis: but I differ from him in this; for the danger which he endeavours to avert by repeated venesections — and by them chiefly, if not solely — may be more certainly and safely prevented by the means about to be noticed, when prescribed after more moderate or less frequent depletions than he recommends. Besides, internal carditis sometimes occurs in cases where bloodletting had been previously and even copiously practised; as well as in others where it must be very cautiously and moderately resorted to. In all the forms of carditis, and particularly in pericarditis, it is often necessary to repeat the venesection oftener than once; but as often, after one moderate or copious venesection, cupping will be the best mode of abstracting blood. Indeed, a sufficient quantity may be taken away by this mode from the first, if the operation be properly performed. When the symptoms are severe, and the disease fully developed, the depletion should be prompt, copious, and *repeated* according to circumstances; but care ought to be taken not to defer the repetition of it until the recurring inflammation proceeds far: the least indication of unsubdued action, or the earliest sign of a return of the disease, requires that this means should be again cautiously resorted to, aided, however, by the remedies about to be noticed. In the circumstances under consideration, nervous excitement, or irritation, may be mistaken for unsubdued inflammatory action. This may become a dangerous, if not a fatal error; and acute observation and enlightened experience can alone guard against it.

142. *C.* After bloodletting, the rapid induction of the *mercurial action* is of the greatest importance. With this intention *calomel* should be given, every four or six hours, with *opium* and small doses of *tartarised antimony,* or James's powder, or with *colchicum* or *digitalis.* These medicines act beneficially, not only by abating the morbid action of the heart, but also by in-

ducing more rapidly the specific effects of the mercury. In the rheumatic forms of carditis, colchicum is extremely useful. It may be prescribed either with calomel, or with saline medicines, especially the alkaline carbonates. I agree with Dr. Roots in his recommendation, that patients should be kept long under the mercurial influence; and that a local depletion should be resorted to, whenever the symptoms become aggravated. When palpitations or nervous symptoms follow depletions and the production of the mercurial action, *camphor* (F. 373. 375. 555.), or *assafœtida* (F. 905.), or the decoction of *senega* (F. 74.), in moderate doses, will be found extremely useful in reducing the irregularity and the frequency of the heart's action. If the irritability of the heart still continue, these medicines may be given with *digitalis* (F. 574.), or with *hyoscyamus* (F. 460.), or with *opium* (F. 493.), or with the muriate or acetate of morphia (F. 537.), or with the *hydrocyanic acid*. This last has been strongly recommended by Dr. Elliotson in such cases; and I have found it extremely useful. The extract or tincture of *hop*, either alone or conjoined with camphor, or with assafœtida, or with the compound galbanum pill, will also be found of service. Where it is still necessary to keep up the mercurial influence, the blue pill may be added to either of these. Anodyne *plasters* (F. 108. 117.) may also be applied over the sternum: those containing camphor and extract of *belladonna* (F. 112, 113.) will be found most beneficial. Anodyne *liniments* (F. 297. 313.) will likewise be useful, particularly when pain or irritability continues after the mercurial action is induced.

143. *D.* In the more *chronic* or *sub-acute* states of inflammation of either of the constituent tissues of the heart, the means already recommended should be prescribed according to the severity and peculiarities of the case. If effusion have taken place into the pericardium, or if excrescences, or other alterations, about the valves or orifices be presumed to exist, external derivatives, by *blisters*, repeated or kept open; by *moxas, setons*, or *issues*; by the tartarised *antimonial ointment*, or by *croton oil*, may be tried. These derivatives are most serviceable when directed to a part at a little distance from the region of the heart. The præcordia will thus remain free for the application of either of the plasters, or of the liniments recommended above (§ 142.), or of mercurial ointment with camphor. When, in these states of carditis, the action of the heart becomes inordinate, M. Bouillaud and some French physicians advise eight or ten grains of powdered digitalis to be sprinkled over the blistered surface. I have had no experience of this mode of employing digitalis. When, in addition to the irregular and excited action, there is more or less pain — a perverted state of sensibility following the morbid vascular action — ointments or embrocations containing the *narcotic alkaloids*, especially *veratria, delphinæa*, or *aconitine*, may be then tried, in the manner advised by Dr. Turnbull. I have prescribed the first of these substances, in two or three cases of this kind; but, although it was not devoid of a certain degree of efficacy, it was not so beneficial as was anticipated from the praises bestowed upon it. In neuralgic affection of the heart, and in angina pectoris, the external use of these substances is sometimes productive of relief.[*]

144. *E.* When the inflammatory affections of the heart are *connected with arthritic or acute rheumatism* — in these especially, but also in other cases of carditis — a superabundance of fibrine or of albumen in the blood should be expected, and the disposition to its coagulation on the inflamed surface ought to be prevented as much as possible. The only means which I know, capable of fulfilling this intention, are — mercurials combined as above advised, particularly with colchicum or antimony; the spirits of turpentine given in drachm doses three times a day, until the kidneys become affected; the subborate or the subcarbonate of soda or of the other alkalies; and the hydriodate of potash. These, after vascular depletion has been employed sufficiently, will often be of service, especially if they be judiciously combined with sedatives or narcotics, and aided by external derivatives; substances of an acid nature being at the same time avoided. Bloodletting will rarely of itself remove altogether this or any other form of carditis, or change the morbid state of the blood, unless it be assisted by other means, more especially by those already mentioned.

145. *F.* When either of the forms of carditis supervenes in the course of *eruptive* or *continued fevers*, after having a cautious recourse to general or local depletion, the milder preparations of mercury in frequent doses until the mouth becomes affected, the alkaline subcarbonates, spirits of turpentine internally, or externally in the form of stupe or embrocation, mercurial liniments or ointments with camphor, &c., and external derivatives, are most to be depended upon. The action of the kidneys should also be promoted by conjoining these with anodynes, nitre, or the sweet spirits of nitre, digitalis, camphor, opium, &c., according to the peculiarities of the case; or by assiduously rubbing a stimulating *liniment* (F. 297. 311.) over the loins. If the inflammation affect chiefly the internal membrane of the heart, in the course of exanthematous or low fevers, or if it seem to have been induced by morbid or irritating matters in the circulation, vascular depletions must be employed with caution; in the latter of these circumstances, they will often be more injurious than beneficial. The other means, however, just recommended, particularly camphor, nitre, the alkaline subcarbonates, and opium, should not be neglected.

146. *G. Relapses* of carditis, especially of pericarditis, are very common, particularly when the

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[*] Dr. Turnbull prescribes *veratria* and *delphinæa* in similar formulæ and in the same doses. He directs half a drachm of the alkaloid to be dissolved in a drachm of sweet oil, and made into an *ointment* with an ounce of prepared lard; — or a scruple of the alkaloid to be dissolved in two ounces of rectified spirit, for an *embrocation*; — or one grain in twelve pills, with extract of hyoscyamus, &c., one of which is to be taken every three hours. A small portion of the ointment, or of the embrocation, is to be rubbed over the præcordia, for ten or fifteen minutes, twice a day. He prescribes *aconitine* in similar formulæ to the foregoing; but he directs only sixteen grains, and eight grains of it, to the same quantity of ointment and spirit respectively. — Of the tincture of aconite (prepared from one pound of coarsely powdered aconite root macerated in two pounds of rectified spirit for seven days), he gives four or five drops three times a day; and employs it also externally.

patient relinquishes medical and moral treatment, before the morbid condition is entirely removed and the functions of the organ entirely restored, or when the inflammation has left more or less alteration of structure, or when the mercurial influence has been imperfect, of too short duration, or suddenly terminated. This influence should therefore be exerted fully, continued for some time — not less than two or three weeks — and allowed gradually to subside. In cases of relapse, the large depletions, often required in a first attack, are frequently hazardous. Local bleedings and a moderate use of mercury are generally sufficient. Relapses are usually of a sub-acute or chronic form, and are often merely exacerbations of unsubdued disorder, or inflammatory action superinduced in parts already altered in structure as well as impaired in function. Hence these remedies should be prescribed with more precaution and restriction than in first attacks.

147. External derivatives employed so as to produce a permanent effect, are usually of service in relapses, as in the chronic states of the disease. Blisters should be repeated, or kept open; but they should not be applied immediately over or too near the heart, nor longer than to produce redness or incipient vesication. The part ought then to be covered by a warm bread-and-water poultice, which ought to be several times renewed. The irritating effects produced on the circulation by the absorption of the cantharides will thus be in some measure prevented. Other means of derivation are often preferable to blisters, especially tartarised antimonial ointments or plasters; or warm turpentine stupes, embrocations, or liniments; but the former of these, as well as setons and issues, should be directed at some distance from the inflamed organ. If these occasion constitutional irritation or debility, they should be relinquished; or anodynes may be given with gentle tonics, as the tincture or extract of hop with camphor or assafœtida, or the medicines of this kind already advised (§ 142.), may be prescribed, in combinations according to circumstances. — The diet should be light and moderately nutritious.

148. *H.* In the different states of carditis, the bowels must be kept moderately open by *mild* and *cooling purgatives*, but severe purging ought to be avoided. The functions of the other excreting organs should also be promoted. The urine especially ought to receive attention, both as to quantity and quality. If it abound with acid, as generally observed in the rheumatic complications, the alkalies, or the subborate of soda, may be given in large doses, with colchicum, camphor, digitalis, or hyoscyamus, &c. The states of the stomach and liver require careful regulation; and the redundancy of excrementitious matters in the blood must be prevented by promoting the free action of all the emunctories.

149. *I.* The *diet* and *regimen* should be strictly antiphlogistic in the more acute states of the disease. As these pass away, or lapse into more chronic forms, bland, mucilaginous or farinaceous articles of food, according to the circumstances of the case, may be allowed; but even these ought to be given sparingly until convalescence is established. In the more chronic cases, or after relapses, the diet may be more nutritious, light animal food and broths being allowed in moderate quantity. Still the principal part of the diet ought to be chiefly farinaceous; and all exciting or heating beverages must be avoided. During the different forms and complications of carditis, perfect repose, mental and physical, ought to be preserved. The patient's *drink*, in acute or first attacks especially, should be emollient and cooling. A weak decoction of marsh mallows, or of barley, or of liquorice root, or mucilaginous fluids containing small quantities of the nitrate of potash, and the subcarbonate of soda, or the subborate of soda, will be found generally appropriate. Beverages containing an acid should be avoided.

150. x. OF INFLAMMATIONS OF THE HEART IN CHILDREN. — *A. Internal Carditis* is sometimes met with in *children* — most frequently after small-pox, scarlatina, pneumonia, hooping-cough, and measles: but it occasionally also appears as a primary affection. It is often connected with articular rheumatism, or complicated with pneumonia or pertussis. I have observed it to attend, in its more acute states, the secondary fever of small-pox, but it more commonly appears during convalescence from these eruptive diseases. It is generally insidious in its attack and early progress. The pulse becomes quick, irritable, small, and irregular. Cough, without expectoration, or increase of pain, is sometimes present. The sounds of the heart are extended, and the pulsations are indistinct or tumultuous, or run into one another. Breathing is short or hurried, especially on any exertion. A heavy pain or aching, or soreness is felt under the sternum, and to the left side. The jugular veins often pulsate; the face is anxious; the hands become hot in the evening, and the child cannot preserve the horizontal posture in bed. Still it walks about, appears only much out of health, is short-breathed, irritable, and very delicate. On auscultation, a blowing or bellows sound is generally heard more or less distinctly. At last hypertrophy, with dilatation of the heart, becomes manifest, and all its consequences.

151. *B. Pericarditis* is a much more common disease in children than is generally supposed. I have met with it often, both in its simple and complicated forms; and at all the epochs of childhood — from three or four years and upwards. It is frequently associated with endocarditis, and true carditis, and with pleuritis or pleuro-pneumony. In the latter complications, it often proceeds to a fatal issue, without having been recognised during life, it having been masked with the pulmonary affection. Most commonly, however, it is connected with acute arthritic rheumatism; and in this case there may exist also internal carditis, and diaphragmatic or pulmonary pleuritis.

152. *C.* The *Causes* of pericarditis in children, are nearly the same as in adults. I have observed the disease chiefly in children who live in low cellars, and in ground floors, and are much exposed to cold and humidity, especially if they be imperfectly clothed, and ill-fed. It is from these causes principally that articular rheumatism, with which the different forms of carditis are generally associated in children, also arises. Pericarditis is often occasioned by exanthematous fevers, and by inflammations of the lungs or pleura; or it follows these diseases, most pro-

bably, in consequence of exposure to cold, or to vicissitudes of temperature during convalescence from them. It is extremely rare to meet with articular rheumatism in persons under puberty, and especially in children, unconnected with external or internal carditis, or even with both. The *Symptoms* of pericarditis in children, and the structural lesions produced by it, as well as those consequent upon endocarditis, differ in no respect from the history given of them in adults.

153. *D.* The *Treatment* of inflammation of the heart in children should be strictly and actively antiphlogistic, at an early stage. Decided local depletions, the exhibition of calomel or other mercurials with colchicum, or antimonials, or other anodynes; mild purgatives, external derivatives, perfect repose, and a bland low diet, with the emollient and alkaline drinks already prescribed; are the chief means of cure.*

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* On referring to my note-book, for cases of pericarditis in children, I find that, in those from five to seven years of age, the following was the treatment most commonly prescribed. All these cases were connected with articular rheumatism. — After cupping or applying leeches over the sternum, according to the age and strength of the child, a powder, consisting of three grains of calomel, and one of James's powder, was directed to be taken three times a day, and continued till the gums were affected. This mixture was also prescribed, and the effects of both carefully observed: —

No. 252. — ℞ Mist. Camphoræ ℥ iij.; Liq. Ammon. Acet. ℥j.; Vini Antimonii Tart. ʒ ss.; Tinct. Sem. Colchici ♏ xxv.—xxx.; Syrup. Tolutan. ℥j. M. Fiat Mist., cujus capiat Coch. ij. minima, tertiâ vel quartâ quâque horâ.

Blisters were generally directed to the right side of the chest, with the precautions above enforced (§ 147.); and where there appeared a tendency to effusion into the pericardium, the following was sometimes directed: —

No. 253. — ℞ Mist. Camphoræ, Aq. Fœniculi, āā ℥ jss.; Liq. Ammoniæ Acetatis ℥j.; Potassæ Acetatis ʒ ijss.; Spirit. Æther. Nit. ʒ j.; Tinct. Digitalis ♏ xxv.; Tinct. Scillæ ʒ ss. M. Fiat Mist., cujus capiat Coch. i. medium, quartis horis.

If the internal surface of the heart seemed to be inflamed, after the remedies already noticed, the following was often employed: —

No. 254. — Mist. Camphoræ ℥ ivss.; Potassæ Nitratis ℈ ij.; Sodæ Sub-carbon. ʒ j. (vel Sodæ Sub-boratis ʒ ss.); Spirit. Ætheris Nit. ʒ jss.; Tinct. Digitalis ♏ xx.—xxx.; Syrup. Papaveris ℥j. M. Fiat Mist., cujus capiat Coch. ij. minima, vel j. medium, quater in die.

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V. — Of Structural Lesions of the Heart and Pericardium.

Classif. — IV. Class, II. Order (*Author*, in *Preface*).

154. Defin. — *Alterations of one or more of the constituent tissues or compartments of the heart, generally arising from previous local or constitutional disease, and occasioning more or less obvious lesions of related organs.*

155. This class of diseases of the heart might, according to the definition just given, have comprised several alterations of structure which have been already considered. But, as these alterations more immediately proceed from inflammatory action, they have been noticed under the head of inflammations of this organ. The lesions, however, which remain to be described, do not depend alone upon either of the chief pathological states already discussed. They are no more the consequences of inflammation, than they are of altered nervous power. Indeed, they may even occur without any evidence of either morbid condition having existed, although they often more remotely result from certain combinations or forms of these conditions. The only inference that can be drawn from a minute examination of a large proportion of them is, that the organic nervous influence, and, consequently, that the states of vascular action and of the circulating fluids, have been altered in such a manner as to have affected the nutrition of one or more of the constituent structures of the heart, or to have given rise to preternatural and adventitious productions in that organ. (See art. Disease, § 93. *et seq.*) In the consideration of the structural lesions of the heart, I shall notice, in the *first* place, those which seem to be the simplest in their nature, and in respect of the morbid conditions out of which they arise; and subsequently those which depend upon more complicated pathological states.

i. Hypertrophy of the Heart. — *Increase of the Muscular Tissue of the Heart.*

156. Defin. — *Augmentation of the muscular substance of the organ, resulting from increased nutrition, and this from excited action.*

157. *A. Description.* — Although Diemerbroeck, Bartholin, Lancisi, Morgagni, Senac, Borsieri, Corvisart, and others, had described, more or less fully, hypertrophy *with* dilatation, and had even noticed the simple form of hypertrophy, or that *without* dilatation, yet it was not until 1811 that the different varieties of the lesion under consideration were fully investigated. In that year M. Bertin described the several forms of hypertrophy with an accuracy fully confirmed by the subsequent researches of Laennec, Elliotson, Hope, and Bouillaud. — M. Bertin considered hypertrophy nearly as follows: — 1st, *Simple hypertrophy*; the parietes of the compartments being thickened, the cavities retaining their natural dimensions; — 2d, *Hypertrophy with dilatation*; the cavities being increased in capacity, and their parietes either of natural or of augmented thickness; the *Active Aneurism* of Corvisart, and the *Excentric, or Aneurismal Hypertrophy* of Bertin; — 3d, *Hypertrophy with diminution of the cavities*; the *Concentric Hypertrophy* of Bertin.

158. The *second* of these, or *hypertrophy with dilatation*, is the most common. It presents two varieties: — (*a*) That in which the walls of one or more compartments are thickened, and the cavity dilated; — (*b*) That with the walls of natural thickness and the cavity dilated, or *hypertrophy with increased extent of the walls* (Hope). In this latter variety there must necessarily be augmentation of the muscular structure, otherwise the dilatation would be attended by thinning of the parietes. — The *third* of the above forms of hypertrophy is the next in frequency; and the *first* is the least common. For twenty cases of the second form of this lesion, not more than one is observed of the first. A thick parietes and a small cavity of either of the ventricles do not of themselves constitute concentric hypertrophy; for a violent contraction at the time of death may have produced this state. But in this case the bulk of the part would be proportionately lessened. To constitute, therefore, this form of hypertrophy, the parietes should not only be thickened, and the cavity be diminished, but the bulk should either be natural, or greater than natural. In this and the simple hypertrophy of the left ventricle, the thickness is sometimes

double, or even triple, what is natural. BOUILLAUD thinks that the concentric hypertrophy is more frequent and greater in the right than in the left ventricle; and adduces a case from BERTIN, where the parietes of the right ventricle were increased to sixteen lines; a thickness never observed in concentric hypertrophy of the left, although a less degree of thickening is oftener observed in the latter.

159. M. BOUILLAUD adduces several instances of hypertrophy with extreme *dilatation*. In one, the left ventricle could contain the closed hand. In another, the right ventricle could admit a goose's egg; whilst the left could contain the closed hand of a female. In a third, the right auricle of a child of seven years was filled with a coagulum as large as the hand of an adult. In concentric hypertrophy, the cavities of the ventricles, especially of the right, may be *diminished* so as hardly to admit the thumb, or a pigeon's egg. LOUIS and BOUILLAUD have observed the cavity of the right ventricle even less than this. The columnæ carneæ generally participate in this form of hypertrophy, and thereby tend to diminish the cavity. In this ventricle especially, they are often remarkably thickened and interlaced; and they may even subdivide the cavity, or traverse it, or be so hypertrophied as nearly to fill it (BERTIN, BOUILLAUD, and HOPE).

160. Hypertrophy may be limited to a single compartment, or it may extend to two or more; and even, although rarely, to the whole organ. It is, in all its forms, more frequently observed in the ventricles than in the auricles, as the former are most obnoxious to the exciting causes (§ 165.). In some instances, one cavity is thickened, whilst another is attenuated. When hypertrophy with dilatation extends to all the compartments, the heart is often enlarged to three or four times its natural size. It then usually assumes a globular form, the apex being nearly effaced; and it lies transversely in the thorax, the diaphragm turning it in this position, and considerably to the left. It also rises high in the chest, and pushes up, and presses upon, the lung of the left side. The situation of the greatest thickening is usually above the middle of the ventricles, where the fleshy columns take their origin; but an irregular form of hypertrophy is occasionally seen. The interventricular septum is not so often thickened as the external parietes. — Hypertrophy may be confined not only to a single ventricle, but even to a part of it, as the base, the apex, the fleshy columns, or the external walls; the rest of the compartments being either natural or thinned. A ventricle may also be contracted in one part, and dilated in another; but these latter alterations are comparatively rare. It is obvious that the heart will vary in its external form, according as the hypertrophy is confined to one compartment, or is extended to two or more, or as either form of this lesion predominates. When there is great dilatation, the fleshy columns are often stretched, flattened, or attenuated.

161. Hypertrophy of the auricles is generally attended by dilatation, the simple and concentric forms being very rarely observed in them — so rarely that LAENNEC does not appear to have met with these forms in this situation. The musculi pectinati are more enlarged than any other parts of the parietes of the auricles; and sometimes they alone are hypertrophied. Dr. HOPE remarks, that as the musculi pectinati are larger and more numerous in the right than in the left auricle, it is in the former that the thickening proceeds to the greatest extent; the right auricle being thereby rendered nearly as thick as the right ventricle (§ 9.).

162. *B. The Nature and Causes of Hypertrophy.* — The hypertrophied muscular tissue of the heart is generally of a livelier red hue than the natural structure, and at the same time firmer and more elastic. This circumstance, in connection with that of hypertrophy sometimes following inflammation of the external and internal membranes, and being even occasionally associated with inflammation of the internal surface of the aorta, has induced some pathologists — especially BERTIN, BOUILLAUD, ANDRAL, and ELLIOTSON — to refer this lesion to inflammatory action; and they have considered the accompanying pain and sense of heat in the cardiac region occasionally complained of, the absence of any obstacle to the circulation in some cases, and the not infrequent complication of it with more or less recent inflammatory products on one or other of the surfaces, or with increased vascular injection, as proofs of this origin. M. BERTIN quotes, in support of this view, the experiments of M. CHEVALIER, who found, on comparing an hypertrophied ventricle with a healthy specimen, under the microscope, that the fibres of the former were much redder than those of the latter; and that, on steeping a portion of each in separate quantities of distilled water, the hypertrophied portion reddened the water more than the other, and when taken out was still the redder of the two. On being put in boiling alcohol, it was found to contain less fatty matter. On this point, which is one of some importance as regards the treatment, the writers just named contend that, although it may be considered that this lesion is most frequently produced by obstruction in the opening leading from the hypertrophied cavity, and depends upon increased muscular efforts to carry on the circulation through it, occasioning an increased circulation in the nutrient vessels, and hence augmented nutrition of the part; and although this undoubtedly obtains to a great extent, and amounts very nearly to one form of inflammation — to inflammation with a developement of the formative process; yet hypertrophy does not always depend upon such obstruction; and even when it does, it may be considered not the less inflammatory, inasmuch as the obstruction, whether in the valves or in the state of the orifices, is almost always a result of, or an attendant upon, inflammation; the obstruction, as well as the hypertrophy, proceeding from the presence or continuance of increased vascular action, especially of the nutrient vessels.

163. Notwithstanding these arguments, hypertrophy of the muscular tissue does not appear to be the immediate result of inflammatory action, although it is generally consequent upon the changes produced by this state of action, and is often associated with it in the other constituent tissues of the heart. Indeed, it is not unusual for inflammation to occur in these tissues in the course of hypertrophy. Admitting that the obstruction to the circulation, productive of enlargement of one or more of the compartments, is not

always seated at their openings, yet the inordinate action either caused by nervous excitement long continued and by inflammatory irritation of the internal membrane, or required to overcome the impediments occasioned by false membranes and by adhesions of the pericardium, may so develope the muscular structure of a part, or the whole of the organ, as to constitute a very remarkable degree of hypertrophy, although the orifices are unobstructed. If the opinion I have contended for above (§ 6.),—that the heart possesses a power of active dilatation, as well as of active contraction,—be admitted, the circumstance of causes which impede the dilatation of one or more of the cavities being attended by hypertrophy will be readily explained; and one of the arguments in favour of the opposite doctrine disposed of. When this lesion is seated in the ventricles, especially in the right, it is occasioned, perhaps, as frequently by these causes, as by any obstacle to the onward current of the circulation. The increased firmness and elasticity of the hypertrophied structure is an additional evidence that this lesion is not in itself inflammatory; for it presents neither the friability and softening, nor the induration and morbid colour, observed to follow inflammation.

164. Viewing, therefore, hypertrophy of the heart as the result of augmented nutrition consequent upon increased exercise of the muscular structure, the increased exertion requiring, and hence inducing, a more active state of the circulation in this structure, it follows, that whatever occasions this increase will, if long continued, give rise to this lesion, in some one or other of its forms, especially in young, sanguine, or plethoric persons, or whilst the powers of life are unimpaired. Whatever excites the nervous influence of the heart, so as to produce long-continued palpitation, or demands from the organ a greater power, either of contraction or of dilatation, will produce it, particularly in the compartments having a more direct relation to such exciting cause. The more *remote causes*, therefore, of hypertrophy may be divided into — 1st. Those which act directly upon the nervous influence of the heart; — 2d. Those which impede the onward current of the blood, and thereby occasion reaction of the muscular structure, in order to overcome the distending or opposing fluid; — and, 3d. Those which encumber the muscular actions of the organ, and render either the contractions or the dilatations of its cavities more difficult, and require a more energetic exertion of these actions, than natural. It must not, however, be supposed, that the causes belonging to either of these orders produce the effect singly. Two or more of them, although belonging to different orders, often act in unison in producing this lesion.

165. *a*. The *exciting causes* which act primarily upon the nervous influence of the organ are — all the moral emotions, the other causes shown above to produce palpitation (§ 45, 46.), and the physical agents which occasion increased circulation. Protracted muscular exertion, by returning the blood to the heart with great rapidity or force; a stimulating and rich diet, by exciting the heart, and at the same time loading it with a rich blood; and the abuse of spirituous and intoxicating liquors; are often more or less directly concerned in the production of this lesion, although other causes frequently co-operate with them. — *b*. The causes which produce reaction by obstructing the circulation are chiefly mechanical, as the alterations in the orifices and valves already described (§ 66, 67.); contractions, dilatations, and aneurisms at the commencement of the arterial trunks — especially the aorta; congestion of the lungs, or interrupted circulation through them, from disease of their substance, or of the bronchial tubes, or of the pleura, or from emphysema, and from the accumulation of fluids in the pleural cavities; the frequent recurrence of spasmodic and convulsive affections, particularly asthma and hooping cough; and whatever impedes the circulation in the aorta, vena cava, and principal vessels immediately connected with them, as wearing strait corsets, the gravid uterus, and large tumours. Under this head, also, may be mentioned, insufficiency of auriculo-ventricular valves, either from atrophy or contraction of them, or from dilatation of the orifices. Contractions of these orifices, or obstructions caused by adhesions of, or excrescences upon, the valves, will occasion hypertrophy not only of the auricles, but also of the ventricles — of the auricles, from the obstruction at their outlets, and the consequent distension of their cavities; of the ventricles, from the augmented force of dilatation required to fill them; the concentric form of hypertrophy depending chiefly upon this latter cause. — Of the other causes of hypertrophy it is unnecessary to make particular mention, as they are of less frequent occurrence, and do not differ materially from those already noticed in connection with excited action (§ 19. 45.) and inflammations (§ 126.) of the heart.

166. It may be stated in general terms, that the same causes and lesions of structure which occasion *thickening* of the parietes of a compartment, or thickening with dilatation, will produce in other persons simple *dilatation*, or dilatation with *attenuation* of the parietes. The alterations of the thickness of the walls, as well as of the capacities of the cavities, seem to depend very much upon the the states of vital energy and resistance, and of nutrition. In young and robust persons, thickening of the walls, with or without dilatation of the cavities, of one or more of the compartments will most likely occur; whereas in the delicate, the lymphatic, or leucophlegmatic, in the ill-fed, and in those either advanced in life, or exhausted by previous disease, dilatation, or dilatation with attenuation of the parietes, of one or more of the chambers, will most probably take place; but much also will depend upon the nature of the obstruction or cause out of which the hypertrophy or dilatation arises. Where the obstruction to be overcome is relatively greater than the power of the organ to overcome it, dilatation of the cavity more frequently takes place, than thickening of the walls of that cavity; and where the obstruction is *before* the hypertrophied cavity, more or less dilatation is usually observed; the degree of thickening or of attenuation of the parietes depending upon the states of vital power and of nutrition as just stated. Where, however, the obstruction is *behind* the hypertrophied compartment, thickening of its walls, with or without diminution of its cavity, is the common attendant.

— When the cause of hypertrophy is regurgitation of blood into the cavity, owing to insufficiency of the valves at the outlet, there is generally more or less dilatation; but there may be either thickening or attenuation of the walls, according to the states of vital energy and nutrition. — Where there is actual thickening of the muscular substance, the coronary arteries are found proportionally enlarged, indicating a greater activity of the vital and nutritive actions of the organ. — Dr. HOPE considers, that, when hypertrophy is connected with an obstruction *behind* it, the alteration is owing to the retarded circulation in the veins which is propagated through the capillaries to the arterial system, and ultimately to the heart. He thus explains the occurrence of hypertrophy of the left ventricle, when the mitral orifice is contracted. But the active efforts made to fill the ventricle seem to me to be the cause of this association of hypertrophy (§ 165.); for it is often observed, where the extreme venous congestions to which Dr. HOPE's mode of accounting for it would necessarily give rise, are not met with.

167. *C. The Complications of Hypertrophy of the Heart* are principally those morbid conditions, of which the enlargement is a frequent consequence, particularly those just mentioned (§ 165.), and chronic inflammations of the internal and external surfaces of the organ. These latter lesions, as well as disease of the orifices and valves, not only give rise to hypertrophy, but also often complicate it during its future course. When inflammatory irritation is induced in the internal membrane of the cavities, excited action of the muscular structure is the usual consequence; and when this is long kept up, hypertrophy will follow to a greater or less extent. When pericarditis is followed by adhesions or by false membranes, thickening of the walls of the compartments will also sometimes result. The increased action required, in this encumbered state of the organ, in order to keep up the circulation, developing and augmenting the muscular structure of one or more of the compartments. In these cases, additional lesions are often observed, particularly of the valves and orifices; and adhesions of the pericardium to the pleura, or other alterations of the collatitious viscera, frequently also exist.

168. Nothing is so common as to find one or more of the above changes of the internal and external surfaces of the heart complicated with hypertrophy. M. BOUILLAUD remarks, that, when inflammation of the external, and especially of the internal, sero-fibrous tissue of the organ has become chronic, hypertrophy of the muscular structure is sure to follow. Of thirty-three cases, which he records, of pericarditis and endocarditis that terminated in thickening and induration, there was not one in which there was not also hypertrophy. Indeed, this latter lesion may be associated with any of the alterations to which the pericardium and heart are liable, or even with several of them; and it may be, moreover, complicated with various changes of the arterial system, especially cartilaginous, osseous, and albuminous productions (see arts. APOPLEXY, § 96.; and ARTERIES, § 38. *et seq.*), aneurisms, &c.; or with congestions of related organs, particularly of the lungs, the brain, and the liver; or with effusion of serum into shut cavities, or into the cellular tissue; or with hæmorrhages from mucous surfaces, or into the substance of the larger organs, as the brain, lungs, liver, &c.

169. *D. Of the Influence of Hypertrophy, &c. of the Heart upon Cerebral and Pulmonary Hæmorrhage.*—It is unnecessary to add much to the remarks already offered on this subject, in the articles APOPLEXY (§ 96.), and HÆMORRHAGE with it require to be considered at this place.—*a.* (§ 30. 107. 115.); but certain points connected *Cerebral hæmorrhage* is probably a more frequent consequence of cardiac disease, than pulmonary hæmorrhage, but facts are wanting to determine to what extent it is so. That it is more common is shown by BERTIN and BOUILLAUD; and it may partly be accounted for by the fact of disease of the pulmonary arteries being much less common than alterations of the cerebral vessels. That an intimate connection often exists between the occurrence of apoplexy and palsy, and antecedent disease of the heart, is now fully established, although doubts are still entertained by some as to the nature of the connection. As long ago as 1822, and 1823, I discussed this question (*Lond. Med. Repos.* vols. xviii. p. 149., and xix. p. 17.), and in the article APOPLEXY (published Sept. 1832), the results of my inquiries were again stated. The occasional dependence of cerebral hæmorrhage on disease of the heart was first remarked by BAGLIVI, who observed it in the case of MALPIGHI, who died apoplectic after palpitations caused by structural change of the heart. It was only incidentally mentioned by MORGAGNI and LIEUTAUD; and not insisted on in the relation of cause or effect, until M. RICHERAND treated of it in his account of the case of CABANIS, in whom this complication was found. PORTAL, TESTA, and SPRENGEL soon afterwards expressed the same opinions as RICHERAND; and ROSSI met with this association of disease in the case of the Crown Prince of Sweden. The frequent connection between cerebral hæmorrhage and disease of the heart has been shown, in this country, by HUTCHINSON, ABERCROMBIE, CRAIGIE, JOHNSON, HOPE, WATSON, and myself; and in France, by BRICHETEAU, LALLEMAND, BERTIN, CRUVEILHIER, BROUSSAIS, ANDRAL, and BOUILLAUD; and the effect upon the brain has been too exclusively limited to hæmorrhage, and too generally imputed to hypertrophy of the left ventricle. There is, however, every reason to believe that softening of the brain, congestions of the veins and sinuses, and serous effusions into the ventricles or between the membranes, occasionally also proceed from cardiac disease, especially when it causes obstructed circulation through the right side of the heart; and that cerebral hæmorrhage may sometimes depend upon the lesions in this situation, as suggested in the articles referred to.

170. M. BRICHETEAU has very recently investigated this subject at some length; but he has insisted chiefly upon the influence of hypertrophy of the left ventricle in the production of hæmorrhage in the brain. He has, however, remarked, that other changes within the head besides this may result from this cause, especially determination of blood to the brain, mental disorder, serous effusion, brain fevers, &c. He observes, that when hypertrophy is accompanied with other

lesions of the heart, particularly with such as impede the free egress of the blood from the left ventricle, as disease of the aortic orifice, the symptoms of cerebral disorder are then much less conspicuous; and that dyspnœa, tendency to syncope, and dropsical effusions, are more marked. — M. BOUILLAUD found, out of fifty-four cases of hypertrophy, in some of which the right ventricle only was affected, and the left one not at all, or very little so, that there were eleven with cerebral disease, six with apoplexy, and five with softening of the brain. In five of these eleven, the cerebral arteries were ossified or cretaceous at one or more points. In six of these cases, the hypertrophy of the left ventricle was *excentric*, in three it was *concentric*, and in two *simple*.

171. Dr. WATSON (*Lond. Med. Gaz.* April 6. 1835.) has made some very judicious remarks upon this subject; but in all the material points, particularly in the explanation of the connection between diseases of the heart and brain, he has been anticipated by the observations I have offered both in the papers referred to above, and in the article APOPLEXY (§ 96.), where I have succinctly given the results of my own investigations. The views there entertained, as Dr. J. JOHNSON has done me the justice of stating (*Med. Chirurg. Review*, April, 1836, p. 512.), in an able inquiry into this subject, are fully confirmed by his own experience, and by the more recently published researches of MM. BOUILLAUD, BRICHETEAU, and others. — As the paragraph referred to in the article APOPLEXY has so fully and completely anticipated the results, at which subsequent writers on this subject have arrived, I have only to request the reader to turn to it, especially as I have nothing further to add to it.

172. *b. The influence of cardiac disease on pulmonary hæmorrhage* has also been adverted to in the article HÆMORRHAGE (§ 30. 115.), M. BOUILLAUD found this form of hæmorrhage less frequently to arise from lesions of the heart, than that just noticed. He has adduced only three instances in which it seemed to depend upon hypertrophy of the right ventricle. And M. BERTIN, whilst he admits the occasional connection between pulmonary apoplexy and hypertrophy in this situation, considers it not common. A more intimate and more frequent dependence of the former on the latter has recently been contended for by M. BRICHETEAU. A different view of the connection between pulmonary hæmorrhage and cardiac disease has been lately entertained by Dr. WILSON and Dr. WATSON, particularly the latter. The dependence of dropsical effusions within the chest upon organic lesions in the left side of the heart, has been long known; but the connection between hæmorrhage from the respiratory surfaces, and these lesions, had been entirely overlooked. Mr. A. BURNS seems to have been the first who took a judicious view of the subject. He observes, that the pulmonic vessels, by the congestion occasioned by cardiac disease, and the continued *vis à tergo*, are ruptured; the blood being forced into the air-cells, or into the cellular structure of the lungs, until this organ appears like liver, or sinks in water. Dr. WATSON has very fully shown that the pulmonary hæmorrhage rarely depends upon hypertrophy of the right ventricle, but chiefly upon narrowing of the left auriculo-ventricular orifice, or rigidity of the mitral valve. Indeed, hypertrophy of the right ventricle seldom exists without disease at the origin of the pulmonary artery sufficient to counteract the increased action of the ventricle. It is, therefore, the obstructed return of blood from the lungs, and but rarely the increased impetus occasioned by the hypertrophied right ventricle, that causes any of the forms of pulmonary HÆMORRHAGE (§ 107. 115.). M. BERTIN admits the influence of narrowing of the left auriculo-ventricular orifice in the production of hæmorrhage into the lungs, and considers the hæmorrhage thus caused to be of a more gradual and passive kind, than that produced by hypertrophy of the right ventricle. Dr. TOWNSEND (*Cyclop. of Pract. Med.* vol. i. p. 138.), states, that of twenty-two cases of pulmonary apoplexy examined by him, more than two thirds occurred in persons whose hearts were diseased, and in two only of these was the hæmorrhage connected with tubercles; but he has neglected to assign the particular lesions of the heart observed in these cases. The very frequent dependence of pulmonary apoplexy on cardiac disease has been insisted upon, also, by CHOMEL, ANDRAL, CRUVEILHIER, BOUILLAUD, HOPE, and others; but with a great want of precision as respects the seat and nature of the primary malady. That cases sometimes occur, in which hypertrophy of the right ventricle is associated with narrowing of the left auriculo-ventricular orifice, in the production of pulmonary hæmorrhage, is shown by an interesting case recorded by Dr. LAW (*Cyclop. of Pract. Med.* vol. ii. p. 403.). A young lady had repeated hæmoptysis, with palpitations, which were more frequent and profuse until death. Both lungs were found engorged with blood, &c. The right ventricle was hypertrophied and dilated; the left auricle dilated and thickened; the left auriculo-ventricular orifice contracted so as hardly to admit a quill; and the left ventricle contracted. The pulmonary artery was dilated and thickened; the aorta was smaller than natural. In this case the congestion of the lungs, consequent upon obstructed circulation through the left side of the heart, had not only caused hæmorrhage, but also hypertrophy, of the right ventricle.

173. It is, moreover, very probable, as I have stated in the article HÆMORRHAGE (§ 115.), that when the more powerful moral emotions are productive of hæmoptysis, this effect is owing as often to their impeding the circulation through the *left* side of the heart, as to their exciting the action of the right ventricle; and that, when the same emotions occasion apoplexy, palsy, or any other cerebral disease, they act as frequently by interrupting the current through the *right* side, as by inducing inordinate action or hypertrophy of the left ventricle. — It is, however, to be presumed, that the opposite passions produce opposite effects upon the heart, and that, whilst terror, fear, grief, anxiety, and other depressing passions impede the circulation through this organ, and cause congestion of its cavities, thereby favouring the occurrence of hæmorrhagic or serous effusions, either in the head or in the chest, the exciting passions, as anger, desire, revenge, &c., accelerate and increase the force of the circu-

lation, by exciting the actions of the ventricles. From this it will appear, that the same class of emotions may induce effusion into either the brain or lungs, according to the predisposition or previous state, functional or structural, of these organs, and to the side of the heart chiefly affected by them; and that, whilst the depressing passions act by interrupting the circulation through the heart, and consequently by impeding the return of blood from these parts, the exciting emotions operate by increasing the frequency and power of the ventricular contractions, and by propelling the blood with greater force into these organs.

170. E. *Symptoms and Diagnosis of Hypertrophy of the Heart.* — *a. The local signs* consist chiefly of a permanent increase of the force of the heart's contractions, of the sphere within which they are perceived, and of the double sounds attending them. These signs — the permanently increased force, extent, and sounds of the heart's actions — are always present; but they vary considerably, and are attended by other phenomena — commonly by an increased extent of dulness on percussion in the cardiac region, and often by some degree of prominence of this part, particularly in young persons. — Where hypertrophy is considerable, the movements of the heart are visible in a large extent of the left side of the chest, and towards the pit of the stomach, and often through the clothes. The apex of the heart is felt more to the left, and generally at the sixth, seventh, or eighth intercostal space, whilst the base corresponds with the third, or even the second intercostal space. — On applying the hand upon the cardiac region, a stronger, a more extensive, and longer enduring *impulse* or *shock* is felt, consisting not only in the striking of the apex, but also in the pushing of the ventricle against the ribs, as the latter swells in each contraction. In these cases, the head, or stethoscope, on auscultation, is raised by the force of the impulse. The first *sound* is generally prolonged and duller than natural; and the more so, the greater the hypertrophy or thickening of the ventricle. But when the thickening is moderate, and the cavity is somewhat dilated, the sounds are stronger and clearer than natural, and heard over a more extended sphere. When the thickening is very great, and the cavity diminished, the sounds become nearly or altogether imperceptible. In simple hypertrophy, the sounds are not usually otherwise morbid; but when there is disease of the valves, then the sounds characteristic of this disease are heard.

175. In proportion as *dilatation* is great, the impulse is slighter, brisker, and lower than natural; and the first sound is louder, clearer, and of shorter duration. The greater the thickening of the walls, the duller are the sounds, compared with the force of the shock or impulse; and the greater the dilatation of the ventricular cavities, and attenuation of their parietes, the clearer, louder, and shorter are the sounds, in relation to the force of the impulse; which, in cases of great dilatation, is much less than natural. Where the enlargement consists chiefly of dilatation, as well as where thickening predominates, the sounds will be otherwise altered, according to associated disease of the valves or orifices of the organ. — In *hypertrophy* with slight dilatation, as Dr. WILLIAMS remarks, there is a strong heaving impulse, with an abrupt collapse, or back stroke, and a prolonged, diffused, but not clear sound. — In *dilatation* with slight hypertrophy, the sound is loud, commencing abruptly, and heard over a large space; whilst the impulse is unnaturally great only when the heart is excited, as in palpitation, when it produces hard, abrupt, and circumscribed blows, without heaving. The palpitations attending hypertrophy will be violent and heaving, when the thickening predominates; but noisy, fluttering, and accompanied with a feeling of faintness, when dilatation is the chief lesion.

176. Cardiac hypertrophy is seldom accompanied with *pain*; but when it is considerable, or very great, a sensation of uneasiness, of weight, or of anxiety, is often felt in the præcordia, or at the epigastrium. *Dulness* on percussion is in relation to the extent of hypertrophy and dilatation, and is observed to extend downwards and towards the left side, owing to the explanation given above (§ 160.), unless when the heart is confined by adhesions. *Prominence* of the cardiae region is not uncommon when the hypertrophy is great. BOUILLAUD has directed particular attention to this sign; but it has been incidentally noticed by others.

177. *b. The general or rational symptoms* vary much with the form of hypertrophy, and with the other lesions of the heart with which this is associated. — The *pulse* in simple and excentric hypertrophy is generally strong, large, full, vibrating, and free; but it is small or oppressed in the concentric variety. When there is also disease of the left orifices and valves, the pulse is weak, small, or otherwise affected. Where the hypertrophy is simple, the face and general surface are animated, the animal heat is developed, and a tendency to active hæmorrhage sometimes observed. The venous circulation is also unimpeded, and neither sanguineous nor serous congestions or effusions take place. But when the hypertrophy is complicated with lesions, interrupting the passage of the blood through the heart, the pulse is weak, small, and irregular; congestions or effusions of blood, and dropsical infiltrations and collections, being common results. — *Respiration* is but little disturbed as long as the hypertrophy is moderate and simple. But when it is excessive, it then encroaches on the lungs, and causes *dyspnœa*; and, as this state is usually a consequence of impeded passage of blood in the heart, causing congestion of the lungs, or serous infiltration of their substance, the dyspnœa is principally owing to these circumstances. Indeed, the majority of sympathetic phenomena, observed in connection with hypertrophy, are no further dependent upon this lesion than that they result from the same alterations as it. — *Cough* is seldom present in the early stages, especially when the hypertrophy is confined to the left ventricle; but when sanguineous or serous congestion supervenes in the lungs, this symptom is commonly observed. — *Œdema* occurs when the hypertrophy is very considerable, and is attended by dilatation. It often appears first in the eyelids and face; and, as the obstruction to the circulation through the heart increases, the serous infiltration augments, and becomes more general.

—In simple hypertrophy, the *countenance* retains its complexion, or is more than usually florid; but when there is dilatation, and in proportion as the enlargement is complicated with obstructed circulation, and as the obstruction extends to the lungs, the lips, cheeks, and even the nose, present more and more of a purplish tint, and the *general surface* assumes a sallow and cachectic hue. — *Apoplectic, paralytic*, or *convulsive attacks*, and *pulmonary hæmorrhage*, have been already noticed as consequences of hypertrophy, particularly of its more complicated states. *Epistaxis* sometimes occurs, and prevents or defers the occurrence of either of these, or of some other serious symptomatic malady.

178. *c. The signs and symptoms of hypertrophy of the individual compartments* require some notice, those just mentioned having reference to this change of the ventricles generally.— The physical signs of hypertrophy of the auricles cannot be stated with any precision in our present knowledge; but, as this change is usually associated with hypertrophy of the ventricles, the distinction between them is not material. — *Hypertrophy of the left ventricle* may be recognised by the following signs: — The impulse of the heart is greatest under the cartilages of the fifth, sixth, seventh, and eighth left ribs; and in this situation there is the most dulness on percussion, and prominence of the thorax. The pulse, if there is no obstruction at the aortic orifice, is strong, tense, full, vibrating, or hard; the face is flushed, and the patient experiences throbbing headachs, giddiness, and sometimes even epistaxis. — *Hypertrophy of the right ventricle* is attended by a palpitation, or an impulse, which is strongest under the lower part of the sternum, where, also, is the greatest dulness on percussion, especially if this lesion be not associated with hypertrophy of the left ventricle; and the pulse possesses neither the force nor tension observed in this latter alteration. There are commonly more or less dyspnœa, short breathing, cough, and subsequently expectoration and lividity of the face; but, as I have shown above (§ 172.), these symptoms are still greater, and more frequently attended by hæmoptysis, when the lungs are congested in consequence of interrupted circulation through the left side of the heart, with which, however, this form of hypertrophy is occasionally associated. Turgescence, pulsation, or undulation of the jugular veins, was noticed, as a symptom of this alteration, by LANCISI; was rejected by CORVISART; but admitted by LAENNEC, and HOPE. BERTIN and BOUILLAUD consider that it is present chiefly in hypertrophy with dilatation, extending to the auricle, and when the right auriculo-ventricular orifice is imperfectly shut during the systole.

179. *F. Terminations and Prognosis.* — *a.* As long as hypertrophy continues simple, and moderate in degree, the patient may experience but little inconvenience from it beyond slight dyspnœa and palpitations, particularly on exertion. But if intemperate living be indulged in, or great corporeal exertion be resorted to, the disease will increase rapidly, and will lead to further change either of the heart or of the more immediately related organs, especially of the brain and lungs. The *progress* of the malady will consequently vary with the peculiarities and complications of the case, and with the habits, occupations, and treatment of the patient: — The *terminations* of hypertrophy depend also very much upon the same circumstances. In its simple states, apoplexy and active hæmorrhages are its occasional consequences (§ 169.); but, if these result not from it, the patient may live many years. When hypertrophy is attended by much dilatation, the symptoms are more severe, and its course more rapid. It does not so frequently cause apoplexy as the foregoing state; but it is generally accompanied with greater disorder of the respiratory functions. Dr. HOPE remarks, that, when this form of the disease demands, owing to the palpitations and dyspnœa, periodical bleedings at short intervals, it hurries with an uninterrupted course to its fatal termination. In the majority of such cases, however, bleedings are not the appropriate means of alleviation.

180. Both the progress and termination of the malady, and consequently the prognosis, more especially depend upon the pathological causes and complications of it. When these consist of diseased valves or contracted orifices, the hypertrophy and dilatation usually proceed to a greater extent, and the balance of the circulation is more disturbed than in the simple form of the complaint. In such cases, congestions and even effusions of blood, or of serum, generally supervene, either in the substance of important viscera, or on venous or serous surfaces, and occasion various consecutive maladies, according to the particular lesion of the heart, and to the consequent seat of congestion, effusion, or infiltration of parenchymatous structures. Hence result pulmonary hæmorrhage, &c., œdema, or effusion into the bronchi, or into the pleural cavities, &c., followed by asphyxy. Abolition of the functions of the lungs causes stupor, or accelerates the alterations which often take place in the brain, especially congestion and sanguineous or serous effusions. Or these latter are the first to occur, especially when the primary lesion is in the right side of the heart (§ 169.).

181. *b.* The *prognosis*, it is evident from the foregoing, is generally *unfavourable*, especially in the more complicated cases, in proportion to the extent of lesion of the orifices and valves, and where hypertrophy is accompanied with adhesion of the pericardium. — Debility, age, a cachectic habit of body, and disease of the lungs, also increase the danger, or rather render it more imminent. — In the simple states and early stages of the malady, when the constitution is not impaired, and when the patient can be subjected to appropriate treatment, and is so circumstanced as to pursue it, the prognosis is much more *favourable*; and, although the alteration already existing may not be diminished, its progress may be arrested.

182. *G.* TREATMENT. — The circumstances which influence the terminations of hypertrophy, and the prognosis of it, should also control the treatment. The simple form of the malady, particularly in young and otherwise sound persons, requires very different means from the complicated, especially when occurring in broken-down constitutions: in the former, *vascular depletions* may be employed, and repeated from time to time; in the latter, they require great caution

and discrimination, or they may be injurious. — Laennec and Bouillaud advise bloodletting and other reducing and tranquillising means, in the manner recommended by Albertini and Valsalva, and to a decided extent. But I agree with Dr. Hope, in considering these measures hazardous, and often injurious, when pushed as far as these writers direct. — M. Laennec, especially, insists upon copious depletion at the commencement of the complaint, — upon a repetition of it every two, four, or eight days, until the palpitations cease, and the heart gives only a moderate impulse, — upon spare diet, with very little or no animal food, — and upon physical and mental repose. If the treatment is not commenced until hypertrophy has occasioned dyspnœa, dropsical effusions, œdema of the lungs, &c., he still advises bleeding and abstinence; and, in all cases, a perseverance in this plan, especially in abstinence, for many months; and he has no confidence in a cure until the expiration of a year (if the patient live as long) of complete absence of all the symptoms and physical signs of hypertrophy. — As to *bloodletting*, the opinion of M. Bouillaud is not materially different from that of Laennec. He prescribes, for an adult of medium strength, and for a medium degree of the complaint, three or four bleedings at the arm, each consisting of twelve or sixteen ounces, followed by one or two cuppings on the præcordia of eight or twelve ounces each, in the course of the treatment. He considers *digitalis* as the next most important remedy — as the true opiate of the heart; and employs it both internally and endermically. He applies a blister on the præcordia; and he sprinkles the blistered surface with from six to fifteen grains of powdered digitalis, directing, at the same time, and long afterwards, mental and bodily repose, and a very restricted diet.

183. *a.* Respecting *bloodletting* in this malady, my experience and opinions are in accordance with those of Dr. Hope; and I consider, with him, sparing abstractions of blood, at intervals of two or three weeks or more, to be the most beneficial. More copious depletions have given temporary relief; but the symptoms have soon returned with increased violence, and carried off the patient, especially in cases where there were also dilatation and lesions of the valves or orifices of the heart. As I have shown in the article Blood (§ 58.), large depletions increase the frequency of the heart's action; and this effect is more readily produced by them when this organ is in a state of enlargement. I perfectly agree with the above writer in considering, that the indications of treatment should be to diminish the quantity, without deteriorating the quality, of the blood, and without producing reaction, or permanently enfeebling the action of the heart and the energies of the constitution, — that from four to eight ounces of blood, taken every two, three, four, or six weeks, according to the circumstances of the case, will be sufficient to fulfil this indication, to keep down inordinate action, and to relieve the dyspnœa, — that the diet should be spare, and consist of white animal food, and liquids in small quantity; and that every thing heating or stimulating, or calculated to accelerate the circulation, ought to be avoided.

184. *b.* Much benefit will result from a judicious selection of *internal medicines.* — Of these, *digitalis, colchicum,* the *sub-borate of soda, mercurial alteratives, hydriodate of potass, refrigerants* and *diuretics,* are most deserving of notice. The secretions and excretions should be freely promoted, by a mercurial alterative taken at bedtime, and a mild purgative in the morning. Equal parts of infusion of digitalis and *camphor mixture* may be also given twice or thrice a day with five or six grains of the sub-borate of soda; or small doses of *colchicum*, with an alkaline subcarbonate, may be prescribed, in an infusion of *tilea Europea*, or decoction of marsh-mallows. — Diuretics are also of service, especially the supertartrate of potash with the sub-borate of soda, in the compound decoction of broom-tops, or in a weak infusion of senega, or in camphor julap, or in the decoction of taraxacum, — the nitrate of potash or soda, with spirits of nitric æther, — and the acetate of potash, with small doses of squill, or the infusion or spirit of juniper. When dropsical effusions take place, these, varied according to the peculiarities of the case, and aided by hydrogogue purgatives, are required; and one or other of the liniments prescribed in the *Appendix* (F. 297. 311.), with the addition of a little of the hydriodate of potash, may be rubbed or applied over the thorax daily. When the breathing becomes much affected, camphor, with small doses of ipecacuanha, and with hyoscyamus, or belladonna, &c., may be tried; and when debility or irritability is urgent, camphor, conjoined with hydrocyanic acid, or with digitalis and the extract of hop, or with gentle tonics and other narcotics, as the acetate of morphia, will be very serviceable. Digitalis was much praised by Ferriar in palpitations from organic lesions; and, when hypertrophy is attended with excessive action and distressing irritability, the following will be found useful: —

No. 256. ℞ Infus. Digitalis ℥ vijss.; Potassæ Nitratis ʒ ij.; Acidi Hydrocyanici ♏ xiv.; Syrup. Aurantii ʒ ij.; Misce. Capiat æger Coch. i. amplum secundâ quâque horâ.

185. *c.* When *diseases of the valves and orifices* of the heart have been concerned in the production of hypertrophy, the treatment is not materially, if indeed at all, different from what is here advised. The fixed alkalies, especially the liquor potassæ, may be given in suitable combinations, as with digitalis, camphor, and various diuretics. The internal exhibition of the hydriodate of potash has been tried by me in several cases; but the results have not always led me to persist in the use of it in cardiac hypertrophy from this cause. It may, however, be given in small doses, with liquor potassæ: it will then not be injurious.

186. *d. External derivatives,* especially setons or issues, inserted near the margins of the false ribs, or below them, have been prescribed by me in several cases, and in some with marked advantage. In every instance, the treatment should be assiduously persisted in; and a most abstemious diet and regimen rigidly observed. Repose of mind and body, and residence in a dry and pure air, are also most beneficial. — As the features of the disease vary, so should the treatment be modified, care being taken not to reduce the vital energies too low. As soon as exhaustion appears, it ought to be met by restorative means. Where

a free discharge is procured by setons or issues — which are especially indicated when the hypertrophy has been consecutive of rheumatic disease of the heart, — a gently tonic treatment will be often requisite; and if any preparation of colchicum be exhibited, it should be given with camphor or ammonia, or even with stomachic or gentle tonics.

ii. OF DILATATION OF THE CHAMBERS AND ORIFICES OF THE HEART. — SYN. *Cordis Aneurisma*, Ballonius, Baglivi; *Passive Aneurism of the Heart*, Corvisart; *Cardieurysma, Cardiectasis*, Auct.; *Expansion of the Heart's Cavities.*

187. CHARACT. — *Slight palpitations, with dyspnœa and cough; the impulse of the heart being weak and diffused; the sounds being louder, clearer, shorter, and heard over a larger extent of the chest, than natural; and the pulse being weak, small, or irregular.*

188. *A.* DESCRIPTION. — *Dilatation* (*a*) may affect equally *the whole parietes* of one or more of the cavities; or (*b*) it may be so confined to *a portion of the parietes* of a chamber as to form an aneurismal pouch. — *a.* The *first* of these varieties usually presents itself in *three forms*: — 1st. *With thickening of the walls* of the compartments; — 2d. *With a natural state of the walls*; — and, 3d. *With attenuation of the walls.* — The *first* of these has been considered in connection with *hypertrophy*; and most of the remarks made with respect to it, also apply to the *second* of these forms. It is chiefly, therefore, to the *third*, or to *dilatation with attenuation* of the parietes of the chambers, that attention is now directed. — The muscular substance of the heart is often healthy, although dilated; but it more frequently is soft, flaccid, or even remarkably softened — especially when the attenuation, as well as dilatation, is great. Sometimes its structure is readily broken down by the pressure of the finger, and is of a deeper or darker red, or of a paler or more fawn-colour than natural. The more remarkable states of softening observed in connection with dilatation have been consecutive of inflammation of one or other of the surfaces, probably extending, in some degree, to the substance of the heart; and occurring in debilitated, previously diseased, rcachectic constitutions.

189. This lesion of the heart is much rarer than dilatation with thickening, or with a natural state, of the parietes of the cavities; and the instances recorded of it are not numerous. LANCISI, MORGAGNI, CORVISART, BERTIN, KREYSIG, J. FRANK, LAENNEC, LOUIS, and HOPE have described but few cases of it. BURNS and LAENNEC believed that rupture might proceed from dilatation; and Dr. HOPE and Dr. WILLIAMS have met with this occurrence, which is most likely to take place in aged persons. Dilatation with attenuation seldom affects one ventricle without the other; but it is more common, or greater, in the right than in the left ventricle. It more rarely is seated in all the chambers of the organ. The attenuation exists in various degrees. It may be so extreme, that the walls of the ventricles hardly are equal to two lines at the thickest parts (HOPE and CHOMEL). The fleshy columns are usually stretched and spread out. The interventricular septum is proportionately less attenuated than the other parts. The dilatation is more in the transverse than in the longitudinal direction of the ventricles; the heart thereby assuming a spherical form, and the apex being nearly effaced. When both the ventricle and auricle of the same side are much dilated, the intermediate *orifice* is generally also widened, and the valve *insufficient* to close it. As in cases of hypertrophy, the position of the organ is somewhat altered when the dilatation is great, it being more or less transverse, and towards the left. A very slight attention is sufficient to distinguish the distension that takes place, during the last moments of life, from morbid dilatation. The former is slight, presents the appearance of tension, and the muscular substance is healthy; the organ often resuming its natural size when emptied. The latter consists not only of distension, but also of flaccidity, thinning, and softening of the parietes.

190. *b. Partial dilatation of one of the heart's cavities* is but rarely met with. M. BERTIN states, that he has seen one portion of a cavity dilated, and another in its natural state, or even thickened, especially in the right ventricle, near the pulmonary artery. This is evidently a slighter grade of that lesion which has attracted, more recently, considerable attention, under the appellation of "*false consecutive aneurism*" (BRESCHET), "*sacculated aneurism*," and "*true aneurism of the heart*" (OLLIVIER). This alteration has been observed by GALEATI, BUTTNER, CORVISART, BAILLIE, ZANNINI, BERARD, ROSTAN, CRUVEILHIER, BRESCHET, J. JOHNSON, ELLIOTSON, ADAMS, DANCE, REYNAUD, &c. It was found in the heart of TALMA, the celebrated French tragedian. It is exactly similar to the aneurism of large arteries, and has been met with only in the arterial side of the heart; and, excepting in a single case recorded by Dr. ELLIOTSON, where it existed in the left auricle, always in the left ventricle. In many of the cases it was found at the apex; in some at the base, or at the middle of the ventricle; and in others at the front, or side. In this last situation it was detected in TALMA. In the instances which occurred to REYNAUD and ELLIOTSON, two aneurisms were found in the same ventricle. This form of aneurismal tumour varies in *size* from that of a filbert to that of the heart itself. The larger tumours usually contain layers of dense coagula, similar to those which fill the cavities of arterial aneurisms. They communicate with the ventricle by a more or less narrow opening, which, with the whole of their interior surfaces, is generally lined with a membrane continuous with that of the ventricles. Like other aneurisms, they are most common in adult males.

191. *c. Dilatation of the orifices of the heart* is not less frequent than expansion of the cavities; and often coexists with it. The orifices may be dilated in various degrees, as already shown (§ 189.); but generally, when the change is very considerable, the valves become insufficient for their purposes, and the expansion, owing to the regurgitation into the auricles, extends to them. The auriculo-ventricular orifices are most frequently dilated; but in very rare instances, the arterial orifices have experienced this alteration in a slight degree.

192. *B. Causes.*—*a.* Most of the causes, remote and immediate, of hypertrophy, are also those

of dilatation of the *chambers* and *orifices* of the heart. As Dr. Hope observes, dilatation is merely a mechanical effect of over-distension. Blood accumulated within the cavities, owing to an interruption to its exit from them, will dilate and attenuate their parietes, in proportion to the resistance opposed, and to the force exerted by the muscular structure in order to overcome it. When that force is weak, or insufficient to overcome the resistance, the parietes yield, and the cavities undergo dilatation, with a rapidity depending upon the weakness of the walls and the extent of interruption. It necessarily follows, that the cavity immediately behind the seat of obstruction will be the first to undergo dilatation, and will experience it to the greatest extent. The compartment, also, having the weakest parietes, is, *cæteris paribus*, the most frequently dilated. — Permanent dilatation is the result of prolonged or repeated causes, as contractions of an orifice, disease of the valves, and frequent returns of nervous palpitations. The depressing passions and emotions, as anxiety, fear, &c. (§ 19.), and whatever tends to weaken the power of the heart, may occasion this alteration. The walls of the cavities may also be unusually weak or thin, *congenitally* and *hereditarily*. Lancisi observed this lesion in four successive generations; and Albertini saw a female die of dilatation, five of her brothers having been cut off by the same malady. It is most common in persons of a tall, thin, delicate, feeble, and nervous or lymphatic conformation, and lax fibres.—*Age* has also great influence on its production. It is not uncommon in young children; but it is most frequent in the aged. It rarely occurs in young adults, unless it has been induced by masturbation, or by fevers and diseases of the respiratory organs. In general, all obstructions to the circulation, whether situated in the orifices of the heart, or in the aortic or pulmonary system, will produce it, as well as hypertrophy; the supervention of the former being the result chiefly of debility of the organic nerves supplying the organ, and of impaired tone or deficient nutrition of the muscular structure — of antecedent disease, characterised by debility or cachexia, or by both.

193. *b.* When the *auricles* are protected by a natural state of their valves, and of the auriculo-ventricular orifices, the ventricles may be dilated without the former being materially affected; but when the auricular valves are diseased, so as to occasion interruption to the passage of the blood from the auricles, or when the auriculo-ventricular openings are dilated, so as to permit regurgitation from the ventricles, then the auricles become dilated, although rarely without some increase in the thickness of their parietes.

194. *c. The diseases of which dilatation is most frequently consecutive*, are, inflammations of the heart, and the lesions of the valves and orifices caused by them; rheumatism extending, or translated, to this organ; tubercular consumption; asthma and emphysema of the lungs; secondary syphilis, especially when treated by excessive quantities of mercury (Albertini); adynamic, typhoid, and exanthematous fevers; scurvy, and carcinomatous and hæmato-encephaloid maladies. M. Bertin contends that dilatation is generally consequent upon some obstacle to the course of the blood; and that the obstacle, at the same time that it gives rise to this lesion of the heart, produces other phenomena, as engorgement of the vessels, serous effusions, passive hæmorrhages; these phenomena, as well as the dilatation, being the result of the same proximate cause. Dr. Hope justly observes that the change in the capacity of the cavities may result not only from obstacles to the circulation, but also from debility. There can be no doubt of deficient tone of the muscular parietes, and of the softening and asthenia of the organ, shown to follow adynamic fevers, and of protracted nervous palpitations, particularly when connected with chlorosis, anæmia, &c., being sufficient to cause dilatation of one or more of the chambers of the heart, independently of any appreciable obstacle to the circulation. Curvatures of the spine, and whatever diminishes the cavity of the chest, or presses inordinately upon the large vessels, may also occasion this alteration.

195. *d.* The same *causes* and *pathological conditions* which occasion the expansion of a whole compartment or of an orifice, may give rise to the dilatation of a portion of it only, in the form of an aneurismal cavity, especially whatever opposes the transmission of blood from the heart, as laborious occupations, the more violent mental motions as hatred, revenge, jealousy, anger, &c. — This — the only lesion of the heart which ought to be called aneurismal — may be produced independently of inflammatory action, owing to great muscular efforts, or obstacles to the circulation. Where the internal membrane is not destroyed, nor thickened, and where the muscular fibres are stretched, separated, or ruptured, antecedent inflammation may not have existed; but where there is thickening of the internal membrane, or ulceration, or adhesion of the external surface of the dilated part to the pericardium, this lesion may be considered to be a more or less remote consequence of chronic inflammation, affecting a portion of the parietes of the ventricle, the dilated part having lost its elasticity and contractile power. In connection with this, some obstacle to the circulation, or to the passage of blood from the left ventricle, has frequently also been present; the increased lateral pressure arising from impeded circulation dilating or extruding the most softened, weakened, or yielding portion of the ventricle. In the unique case of aneurism of the *left auricle* recorded by Dr. Elliotson, there were extreme cohesion and ossification of the mitral valve, and consequent reduction of the auriculo-ventricular opening, — changes always consequent upon inflammatory action, as above insisted upon (§ 68.). The sinus of the auricle formed a large aneurism, containing dense and thick layers of fibrine; the interior of the tumour being lined with the smooth membrane of the cavities, as in aneurism of the ventricle.

196. C. *The Signs and Symptomatic Effects of Dilatation* have been partly noticed under the head of hypertrophy with dilatation (§ 175.); but those which more especially indicate dilatation with attenuation, remain to be detailed. — *a.* When the affection is considerable, and extends to both ventricles in uniform expansion of the parietes, the heart acquires a rounded shape, and the degree of contraction is lessened; and, as the apex is consequently less forcibly impelled against

the ribs, the impulse is slight, brisk, and low in the præcordia. The first sound of the heart is shorter, louder, and clearer than usual, and is heard over a larger extent than would be expected from the weakness of the impulse. When the dilatation is considerable, the first sound resembles in shortness and flapping character the second, and is to be distinguished from it only by its synchronism with the pulse of the carotids (LAENNEC, HOPE, WILLIAMS). When the dilatation is dependent upon disease of the valves and narrowing of the origins of the arterial trunks, the sounds will assume a morbid character accordingly (§ 76.). The pulse in dilatation of the ventricles is necessarily feeble and often small, and various symptomatic lesions are observed, which, however, are referrible rather to the alteration that has produced the dilatation, than to the dilatation itself. In expansion of the left ventricle, the physical signs are most apparent to the left of the sternum, between the fifth and eighth ribs; and the symptomatic phenomena consist chiefly of dyspnœa, oppression in the præcordia, and dropsical effusions in the chest, &c. In expansion of the right ventricle, the physical signs are most evident under the sternum, and are accompanied with a pulsating swelling of the jugulars, especially if the dilatation extend to the auriculo-ventricular opening; the sympathetic changes being principally serous effusions within the cranium, or in the cellular tissue, ascites, œdema of the extremities, short breathing, and various signs of general cachexia.

197. *b.* The *symptoms of partial dilatation* (§ 190.) of the cavities are extremely obscure. Those stated by Dr. BAILLIE are common to all cardiac diseases. Auscultation renders us little or no assistance in ascertaining its existence. It rarely attains a large size — never so large as to produce an external tumour. The cases recorded by M. REYNAUD and Dr. J. JOHNSON terminated in rupture of the aneurism without any previous suspicion of its existence. Dr. ELLIOTSON's and M. CRUVEILHIER's cases presented symptoms which merely led to a belief in the existence of organic disease of the heart. In one of the two cases, mentioned in the catalogue of the preparations belonging to the medical department of the army, the patient had complained of cough, dyspnœa, pain in the chest, and hæmoptysis; in the other, the symptoms were not ascertained. TALMA died of stricture, amounting nearly to obliteration of the rectum. The aneurism of the left ventricle was small and filled with concentric layers of fibrine. It was remembered that long previously, after having enacted the part of Orestes, in the play of Andromache, TALMA felt himself strangely agitated, anxious, and restless for some time; but these symptoms gradually subsided. It was supposed that the internal membrane, or some of the fibres of the muscular structure, had then given way, the consequent effusion of coagulable lymph producing a partial and temporary cure. Others of the cases upon record have been equally obscure: whilst some have been attended by palpitations, urgent dyspnœa, cough, and short breathing; anxiety, pain, and constriction at the præcordia; weak, irregular, or intermittent pulse; inability to lie otherwise than on the back; sudden starting up from sleep, œdema of the extremities, &c.

198. *c.* Dilatation of the *orifices* gives rise to no indications of its existence, unless it is so considerable as to permit a reflux of the current of blood; and even then the signs are equivocal. This reflux is one of the causes of the bellows-sound, and of the purring tremor. When it takes place through the right auriculo-ventricular orifice, it causes a venous pulsation, particularly in the jugulars.

199. *D. Progress, Termination, and Prognosis of Expansion of the Heart.*—The *progress* of dilatation entirely depends upon the nature of the pathological condition, or antecedent disease, of which it is a more or less immediate consequence. A slight degree of expansion, depending chiefly on original conformation, and accompanied with a delicate constitution and thin muscles, may subsist long, or remain stationary for years, without occasioning much disorder beyond dyspnœa, shortness of breath, and palpitations on exertion, or slight asthmatic disorder; but when dilatation is consequent upon a permanent or increasing obstacle to the circulation, or is associated with adhesions of the pericardium, the symptoms are more severe, more rapid in their progress, and attended with evidence of general cachexia. When dyspnœa becomes urgent, or œdema or dropsical effusions take place, or when pulsation of the jugulars is observed, the disease is generally rapid in its progress, especially if exasperated by exertion, mental disquiet, or attacks of fever, &c.; although judicious treatment, by repeatedly procuring the removal of effusions, will often prolong life a considerable time. Much, however, will depend upon the age, strength, constitution, and previous state of the patient. Upon the above considerations the prognosis must entirely depend.

200. *E.* TREATMENT *of Dilatations of the Cavities and Orifices, with Attenuation of their Parietes.* — The *first object* is to ascertain the exciting or pathological cause of the dilatation, and to remove it as much as possible. When the cause consists of disease of the valves or orifices impeding the circulation, it is difficult, if not impossible, to effect this object, yet it ought not to be left unattempted; but when the cause is of a less permanent kind, as peripneumony, spinal curvatures, pertussis, asthma, bronchitis, hydro-thorax, emphysema of the lungs, &c.; or when the dilatation has been produced by laborious occupations, constrained postures, strait lacing, playing on wind instruments, &c.; this intention ought never to be overlooked; for, if the expansion have not proceeded so far as to deprive the muscular structure of the organ of its resiliency, a more or less complete restoration of the dilated cavity may be effected. Even when it is impossible to restore the organ to its healthy state, an increase of the dilatation may be prevented, and the patient's life may be prolonged to the usual limits.

201. The greatest attention should be paid to *diet* and *regimen*, as well as to the selection of *medicinal agents;* and both classes of means ought to be directed to the support of vital power. With this view, vegetable and mineral tonics may be prescribed, with aromatics, antispasmodics, and anodynes, according to circumstances. Small doses of quinine may be given with camphor and hyoscyamus, or of the sulphate of iron or of the sulphate of zinc, with the extract of hop. Valerian, assafœtida, the compound galbanum pill, or the compound iron pill, may also be exhibited in

similar forms of combination; or either of the alkaline solutions in use may be given with chalybeates, or with tonic infusions or decoctions. Where there is any obstacle to the circulation, referrible either to a morbid state of the lungs, or to diseased valves, the fixed alkalies, or the subborate of soda, with tonics, will be found of much service. If there exist pulmonary congestion, with copious and difficult expectoration, the decoction of *senega root*, with an aromatic water, and small doses of camphor, will be productive of benefit. If attacks of dyspnœa or of asthma take place, and if the dilatation be complicated with emphysema or with œdema of the lungs, this combination will be of use; or camphor, ammonia, assafœtida, ammoniacum, the æthers, &c. may be exhibited in forms, which the peculiarities of the case will indicate. At the same time, the surface of the body should be kept warm, and derivatives applied to the extremities, fresh air being freely admitted into the patient's apartment.

202. The utmost attention ought always to be paid to the state of the digestive organs. The secretions and excretions should be promoted; those of the liver and bowels being freely evacuated by an occasional dose of the blue pill at night, and of a stomachic aperient the following morning. Flatulent distension of the stomach and bowels, and acidity, should be especially guarded against, and removed by the means suggested in the article FLATULENCY (§ 15. *et seq.*); for these states of disorder remarkably aggravate both functional and organic affections of the heart, as shown in the article just referred to (§ 8.). — The circulation ought to be kept tranquil by moral and physical quietude, and by a light, nutritious, but not heating, diet. In order to preserve a free state of the cutaneous function, and to prevent catarrhal affections, flannel should be worn next the skin, and the feet kept warm by woollen stockings. Febrile and inflammatory affections, and particularly inflammations of the lungs and bronchi, as Dr. HOPE very properly advises, should be sedulously guarded against, by adopting these and other means, and promptly treated when they occur. — But even in these circumstances, I would add, bloodletting ought to be resorted to with extreme caution, and rarely or never by venæsection. In all cases of expansion of the cavities of the heart, the organ is unable to accommodate itself to large or sudden losses of blood, and hence a fatal collapse may be the result of the abstraction of this fluid. If the contingent pulmonary congestion should render vascular depletion an appropriate remedy, a small quantity only ought to be taken away, and always when the patient is in the recumbent posture, restoratives and external derivatives being also resorted to.

203. If the expansion has followed low or adynamic fevers, or has been caused by venereal excesses or masturbation, or by non-inflammatory softening or relaxation of the muscular structure of the organ, as in cachectic, chlorotic, or scorbutic constitutions, *tonics* are especially requisite; particularly the preparations of iron, the tincture of the muriate of iron, and chalybeate mineral springs; residence in a pure and dry air, and light nourishing food. The vegetable tonics with the alkaline subcarbonates, or preferably with the vegetable or mineral acids, especially the muriatic, the nitro-muriatic, and the acetic, will also be of service, according to the state of antecedent and concomitant constitutional disease.

204. When *disease of the valves and orifices* of the heart, or any other obstacle to the circulation, of which dilatation is a consequence, has proceeded so far as to have also occasioned dropsical effusions, treatment is seldom productive of more than temporary benefit. The means which promise the greatest advantage, especially when effusion has taken place, are so fully stated in the article DROPSY (§ 45—47.), that I need not particularise them at this place. — If permanent dyspnœa, emphysema of the lungs, increased exudation into the bronchial tubes, and difficult expectoration, be associated with this state of cardiac disease, *expectorants*, especially the decoction of senega, the balsams, camphor, ammoniacum, &c., with opium, will be of service.

205. In addition to strict attention to *diet* and *regimen*,—the former consisting chiefly of light animal food, in moderate quantity, and the more farinaceous vegetable substances; the latter of mental and bodily quietude,—the patient should reside in a dry, bracing, temperate, and equable climate, and in large well-ventilated apartments. He should observe early hours, and, as his health improves, take very gentle exercise in the open air. The cold or salt water bath, or the shower-bath, will also be of service, if directed with caution and discrimination. — In this, as well as in all other affections of the heart, bulky, flatulent, and acescent vegetables should be avoided; and that kind of food preferred which is found to be most easy of digestion. Recourse may be had to chalybeate or other strengthening mineral waters, as convalescence advances. Admitting it possible that *partial dilatation or aneurism of the cavities*, and that *dilatation of the orifices* of the heart, may be detected during life, — a circumstance not likely to occur in respect of the former lesion especially, — the treatment will not vary from that which has been now recommended.

iii. ATROPHY OF THE HEART — *Cardiac Consumption.*

206. CHARACT. — *Diminished size or wasting of the heart, the actions of the organ being feeble, limited in extent, and attended by a weak and confined impulse, and by little or no dulness on percussion in the præcordia.*

207. *A.* The heart may be unusually small, *from original conformation*, or *from disease.* — *a.* Many of the instances of extreme smallness of this organ on record are referrible to the former cause. Those adduced by MORGAGNI (*Ep.* lxx. 5.), LIEUTAUD (vol. ii. obs. 453.), BURNS (*Op. cit.* p. 110.), KREYSIG (b. ii. p. 468.), OTTO (*Compend. of Comp. Anat.* p. 264.), and others, are of this kind. The majority of those referred to by LIEUTAUD and PLOUCQUET (*Med. Digest.* art. *Cor — parvum*) are stated so loosely by their respective authors, as to be almost devoid of interest. OTTO thinks that a disproportionate size of the heart to the whole body is sometimes hereditary; and that, when it is congenital, it is often connected with other vicious formations of the organ, or with general weakness and imperfect developement. If a really small heart be fleshy, firm, and red, and its compartments in due proportion to one another, it may be considered as a vice of conformation.

208. *b.* *True atrophy*, or diminution of the

heart from disease, is rarely observed in a remarkable degree. Slight grades of it are, however, not uncommon, especially in wasting diseases, as phthisis, mesenteric obstructions, and chorea, although the atrophy of this organ is not so considerable, nor so rapid, as in other muscles. Otto attributes this to the want of cellular tissue between the muscular fasciculi.—Portal, Testa, and Kreysig suggest, that the seeming diminution, caused by the violent contraction of the organ, at the time of death, should not be confounded with atrophy of it. True atrophy is accompanied with attenuation, softness, or paleness, or hardening of the structure, or with a shrivelled or wrinkled appearance of the surface of the viscus. It may be so considerable as to reduce the organ to one half or one third its natural weight. M. Chomel found the heart not larger than a hen's egg in a man who died in the hospital *La Charité*. As respects its form — 1st. One or more of the compartments are attenuated without any change in their capacities, the heart being but slightly diminished in bulk; — 2d. With attenuation there is much more rarely diminution of the capacities of the chambers, the organ being very much lessened in size; — and, 3d. With diminution of the cavities, the parietes may be of the natural thickness, or even above it: this is the most frequent form of atrophy.

209. *B.* The *Causes* of atrophy of the heart are — 1st. *Local;* — 2d. *Moral;* — and, 3d. *Constitutional.* — *a.* Of the *first*, the most common are compression arising from the pressure of matters effused into the pericardium, or from tumours developed in the mediastinum, and constriction or other changes of the coronary arteries, especially ossific deposits in their coats, &c. I doubt, however, the influence of compression from these causes, as the heart is very rarely found atrophied where the greatest amount of effusion has existed in the pericardium. In the case referred to below, where there obviously is extreme atrophy from local causes, the previous effusion never seemed to have been very great.* — *b.* The *moral causes* consist of mental anxiety, and all the depressing passions, particularly when their action has been prolonged. — *c.* The *general causes* are whatever arrests the nutrition of muscular structures; and yet the heart seldom participates in the change of these parts, or only in a slight degree. In the diseases just mentioned (§ 208.), more or less atrophy is sometimes met with; but it seldom bears any relation to the wasting of the voluntary muscles. In a case of tubercular consumption, in which death occurred instantaneously, before ulceration had commenced, and before emaciation had become considerable, the heart was small and flabby, and the parietes of the ventricles somewhat attenuated. The most marked cases of atrophy which I have seen were in persons who had died after attacks of chorea and chlorosis, and after hypochondriasis and distress of mind.

210. *C.* The *Symptoms* are seldom such as to indicate, with tolerable certainty, the existence of atrophy of the heart, unless it be very considerable. In this case, the impulse is weak, limited, or small; the sounds are indistinct, or faint, in proportion as the cavities are diminished in capacity; and there is little or no dulness on percussion. The pulse is small, thready, and often frequent; and there is commonly marasmus, and loss of colour. Yet emaciation can hardly be reckoned as a sign of atrophy, as it not infrequently accompanies hypertrophy of this organ.

211. *D.* The *Treatment* of this lesion should be directed — 1st, to the removal of the causes, as far as it can be accomplished; and, 2dly, to the restoration of the healthy nutrition of the organ. The latter of these intentions will be best accomplished by attention to the digestive and assimilative functions, and by the use of chalybeate medicines and mineral waters, with suitable exercise in a dry and temperate air; and the other means recommended for *functional disorders* (§ 50—53.), for *softening* (§ 221.), and for *dilatation* (§ 200.) of the heart.

212. iv. Contractions of the Cavities and Orifices of the Heart. — *A.* Diminution of one or more of the *cavities* arises — 1st. From *concentric hypertrophy* of the parietes (§ 158.); — 2d. From *atrophy* of the heart (§ 208.); — 3d. From the pressure of tumours, or of effused fluids, on one or more of the compartments of the organ; — and, 4th. From concretions of lymph or of fibrine, recent or organised. — The *first*, *second*, and *third* of these morbid states have received attention at the places referred to; the *fourth* will be fully considered hereafter. From whatever of these causes the diminished capacity of the cavities arises, it is evident that very serious phenomena will result as soon as this lesion becomes so great as to materially derange the circulation, especially venous congestions, and serous effusions and infiltrations. When the cavity of the left ventricle is diminished, the pulse is small, as in narrowing of the aortic orifice.

213. *B. Contraction of the orifices* of the heart may proceed from the same changes as produce diminution of the cavities; but it most frequently is a more or less immediate result of internal carditis, and attendant upon induration of the valves. As such it has already been considered, when treating of the chronic states of endocarditis (§ 66, 67.).

214. *C.* The *Treatment* of diminished capacity

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* The following case is singular: — A girl, at the age of seven years, was attacked with rheumatism of the joints of the upper extremities, with extension of the disease to the pericardium, — the former affection subsiding partially as pericarditis was developed. The treatment, mentioned in the *note* to par. 153., was prescribed, and the disease nearly disappeared. But the pericarditis returned on two subsequent occasions at considerable and irregular intervals; and, in the second and third attacks, the cartilages of the left ribs were pushed outwards by the effusion into the pericardium. A mercurial treatment was prolonged; recovery seemed more complete, and the case was dismissed. About eight or nine months afterwards, this child was brought to me with the lower half of the sternum, and the cartilages of the left ribs, which were formerly protuberant, drawing backwards towards the spine, so as to form a deep and large depression in this situation, and scarcely to leave sufficient space for an atrophied heart to lie between the spine and the depression. The epigastrium was drawn inwards, and upwards, on each contraction of the ventricles. In this case, which was seen also by some of my colleagues at the Middlesex Hospital, the repeated attacks of pericarditis had given rise to adhesions of the pericardium to the heart, and probably also to the pleura; to this atrophy had succeeded; and the sternum had been drawn inwards with the wasted heart. This child was, even in this state, much recovered. She could take gentle exercise. The heart did not present any morbid sound, at this period; but there was well-marked epigastric pulsation, of a confused kind, probably owing to the pressure of the heart on the aorta. She was alive and able to be about when this was written.

of the *cavities* is rarely followed by any benefit. The changes producing it manifestly are beyond our resources. This remark is nearly applicable to contraction of the *orifices*. The means, however, which may be employed, should depend upon the cardiac lesions, and the symptomatic changes consequent upon this alteration of the orifices and valves. If *hypertrophy* have become associated with it, the treatment advised in the chapter on this lesion (§ 182.), according to the form it may assume, will be appropriate. If *expansion* of the cavities have taken place, the means prescribed under that head will be requisite (§ 200.).

215. v. OF ALTERATIONS OF THE COLOUR AND CONSISTENCE OF THE HEART. — *A.* The *colour* of the heart may vary, or be irregular, both on its surfaces and in its substance. One or more *white* specks, or patches, of different sizes, are often found. They are produced by a slight inflammation, causing thickening and opacity of the membrane, and are seated in either the internal or external surfaces. The structure and external surface of the organ are often *paler* than natural in cachectic, dropsical, and leucophlegmatic habits; and are sometimes of a *pale yellow* in these habits of body, and in hearts which are preternaturally fat. In inflammation, and in hypertrophy, this organ is *redder* than usual. In softening, suppuration, mortification, and other organic lesions, it is often spotted, of a *greyish*, *light*, or *dark brown*. Sometimes the internal surface, in one or all the cavities, is *reddened* throughout by the imbibition of the colouring matter of the blood; and a similar discolouration of the external surface has been observed to follow from the transudation of blood, and from hæmorrhage into the pericardium. OTTO found the heart tinged with green in a case of poisoning with stramonium seeds.

216. *B. Alterations of consistence* have already been partially noticed (§ 113—115.); but chiefly as consequences of inflammation. — *a. Softening* of the heart is not infrequently found in persons who have died of low fevers and malignant diseases, and it then occurs in the advanced stages of these maladies; but it is also met with under other circumstances. It presents two forms — one the result of inflammation (§ 113.), generally with asthenic characters; the other seemingly in no ways arising from inflammatory action, but rather from impaired organic nervous or vital power, and insufficient nutrition of the organ.—In the former, the softening is most commonly attended by a deeper tinge of colour, or discolouration; and the substance of the heart is not wasted, or is even more bulky than natural; signs of antecedent inflammation being usually present either in the internal or in the external surface, or even in the substance of the organ itself. In the latter form the heart is paler, as well as softer, than usual, — is easily broken down, — and frequently the cavities are somewhat dilated; but there is rarely any other distinct vice of structure. In a few extreme cases, the muscular fibres present a sort of fish-like structure, especially in young chlorotic and leucophlegmatic persons.

217. The non-inflammatory form of softening is met with chiefly under the circumstances just mentioned, and in fatal cases of scurvy, purpura, chorea, dropsy, and anæmia. In all these I have seen it, as well as in mesenteric decline, and tubercular consumption. It is occasionally associated with an inordinate deposition of fat around the organ; this latter being generally attended by a relaxed, pale, softened, or atrophied state of the muscular structure of the heart. In persons who have died suddenly, and without any distinct cause, the heart is sometimes soft, flabby, and even bloodless. Cases of this kind are recorded by Mr. CHAVALIER, and by my friend Mr. WORTHINGTON (*Lond. Med. Reposit.* vol. xvii. p. 361.). An instance also recently occurred in my own practice. In the softened state of the heart found in low fevers and in other contaminating diseases, there is also observed more or less dark discolouration of it. Violent exertion diminishes the vital cohesion of this organ, as well as of other muscles, deepens its colour, and causes it to be easily broken down. SENAC and OTTO found it very soft in hunted deer. This alteration is probably increased by the effect which an inordinate acceleration of the circulation produces upon the fibrine of the blood, as shown by HALLER and others. (See art. BLOOD, § 134.)

218. *b.* The *Symptoms of softening* entirely depend upon the proximate cause. If it arise from inflammation, then it is generally attended by the signs and symptoms of an associated *endocarditis* or *pericarditis*. If it be accompanied with *dilatation*, more or less of the phenomena attendant upon that lesion may be expected. In its simple or non-inflammatory states, there are generally great languor and debility; a soft, quick, weak, feeble, and small pulse; frequent faintings; a sallow, pale, faded, or tallowy complexion; passive œdema of the extremities, and sometimes of the countenance; the sounds of the organ being dull and obscure, and the impulse weak or nearly gone. As this lesion is often attended by effusion into the pericardium, the sounds and impulse will be further obscured by this circumstance; and the sphere of dulness on percussion extended accordingly. When it is not thus associated, the faint sounds and impulse of the heart will not be attended by greater dulness on percussion than natural. (See also the sections on *Inflammations* (§ 121.) and on *Dilatation* (§ 196.).

219. *c. Induration of the heart* is generally a remote consequence of inflammatory action (§ 119.), and is more rarely observed than the opposite lesion. It is often simulated by an unusual contraction at the moment of dissolution. In hypertrophy, also, the heart is firmer than natural, but not to amount to a morbid induration, so as to afford great resistance to the scalpel, or to cause a crepitation on dividing it. — Induration may occupy the whole of a ventricle, or only part of it; and it may accompany other lesions, or alterations of the organ as to size. It is evidently the consequence of altered nutrition, and is different from the firmness observed in hypertrophy, as well as from the cartilaginous and osseous hardening of portions of the organ sometimes consequent upon inflammatory action (§ 120.).

220. *d.* Of the *Signs* and *Symptoms* of this lesion, nothing positive is known. LAENNEC supposed that, in its slighter grades, the impulse of the heart was increased; and CORVISART thought that, beyond a certain point, it rendered the

contractions of the ventricles more difficult, and their movements more confined.

221. *e.* The *Treatment* of alterations of the consistence of the heart should be directed according to the evidence of these changes that may exist, and to the associated cardiac and symptomatic changes. In *softening*, we must depend chiefly upon the exhibition of tonics, especially quinine, cinchona, mineral acids, &c., or upon the tincture of the muriate, or the sulphate, or the other preparations of iron, pure air, and the means recommended for dilatation (§ 200.). If it were possible to ascertain the presence of *induration* of the heart, but little could be hoped from medical means. Those advised for hypertrophy (§ 182.) are, perhaps, the most appropriate.

222. vi. Of Serous and Sanguineous Infiltrations of the Heart. — *A. Infiltration of Serum into the Cellular Tissue of the Organ — Œdema of the Heart*, Bouillaud — is very rarely seen. This writer, however, describes it as follows: — The cellulo-adipose tissue enveloping the viscus presents the form of a tremulous, gelatiniform mass; from which exudes, upon pressure, a liquid, transparent serum, which is sometimes colourless, and occasionally of a yellowish green tint. The cellular tissue which is thus infiltrated is of a dull white, or opaline hue, as if macerated by the contained fluid. — This alteration may accompany other dropsical maladies, or cachectic states of the system; but it is referred, by M. Bouillaud, chiefly to a varicose state of the coronary veins, consequent on the difficult passage of the blood from them into the right auricle. Obliteration of some of the cardiac veins will occasion this lesion; but it has hitherto not been described.

223. *B.* The *Exudation* or *Infiltration of Blood* into the cellular tissue of the heart — *Cardiac Hæmorrhage* — has been also met with, but very rarely, and chiefly in the form of *petechiæ*, or small *ecchymoses*. One or two instances of a more copious hæmorrhage into the substance of the organ, so as to form a distinct hæmorrhagic cavity — *Apoplexy of the Heart* — have been recorded. — *Petechiæ* and *ecchymoses*, principally on either of the surfaces of the organ, have been noticed by Stoll, Fairbairn, and Otto. I met with this alteration in a case of purpura hæmorrhagica, and in another of scurvy. In these diseases, and in the putro-adynamic states of fever, I believe that it is not very uncommon. Otto (*Comp. of Path. Anat.* § 177. p. 278.) states, that he met with effusions of blood, in various parts of the heart, in a case of petechial fever; also in a person killed by fire-damp, and in a child who died of hooping-cough. In a case of violent inflammation of the heart, he found small extravasations of blood under the outer membrane. Dr. Fairbairn (*Trans. of Med. and Chirurg. Soc. of Edin.* vol. ii. p. 157.) observed effusions of blood under the inner membrane of the heart in a case of purpura; and Cruveilhier (*Anat. Path.* livr. xxii. pl. 3.), saw the same lesion in the substance of the left ventricle. The exudation and effusion of blood into the pericardium has received attention in the article Hæmorrhage (§ 276.).

224. vii. Of Fatty Degenerations and Obesity of the Heart. — The *fatty degeneration of the structure* of the organ is not to be confounded with an *excessive deposition of fat* between the pericardiac covering and the substance of the heart, frequently met with in corpulent persons. — *a. Excess of fat in this viscus* is often accompanied with a flabby, softened, and attenuated state of the parietes. In these cases, the adipose substance often penetrates to some depth between the muscular fibres. — The symptoms attending this state of the organ cannot be referred so much to the accumulation of fat — to *the obesity of the organ* — as to the change in the muscular parietes attending it; both alterations being results of weakened organic nervous energy, and of, consequently, impaired assimilation.

225. *b. The true greasy degeneration* is a transformation of the muscular substance of the organ into a fatty matter similar to that first described by Haller and Vicq d'Azyr as occurring in the muscles. This lesion is generally confined to a portion of the parietes. Laennec and Andral met with it only at the apex. Dr. Hope found the greater part of both ventricles thus degenerated, the colour being that of withered leaves. More rarely, the substance of the heart has the appearance of lard, as remarked by Corvisart, Burns, Duncan, Cheyne, Luchett, and Chomel; the less altered portions in these cases are not only soft and flabby, but they also have an oily aspect.

226. *c.* Both these forms of fatty degeneration sometimes nearly approximate. M. Andral remarks that, most frequently, the muscular fibres are not really converted into fat, but are only atrophied by the excessive deposition of fat between them; yet, in some cases, they seem to have undergone this change, as they grease both paper and the scalpel, owing to an oily matter infiltrating them. That the atrophy of the muscular substance is not a mere consequence of the accumulation of fat, as Andral and others suppose, and that both changes are joint consequences of impaired vital power and imperfect assimilation, are satisfactorily shown by the circumstances under which they occur — by their being met with only where these primary pathological conditions exist, especially in aged persons, and by their having been found in connection with an excessive quantity of oil in the blood; the increase of this fluid in the circulation being a manifest result of impaired assimilation. Mr. Smith (*Dub. Journ. of Med. Science*, vol. ix. p. 412.) has detailed two cases in which this connection was observed; and one recently fell under my own observation. In Mr. Smith's cases, globules of limpid oil floated on the surface of the blood; in my case, the serum was remarkably milky, from the quantity of fat it contained. — From the history, and the alterations found on dissection, of two cases detailed by Dr. Duncan (*Edin. Med. and Surg. Journ.* vol. xii. p. 65.) and by Dr. Simeons (*Heidl. Kinisch. Ann.* t. iii.), it appears that inflammation of the heart may terminate in the true fatty degeneration of the muscular substance of the organ.[*]

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[*] It may be interesting to subjoin the particulars of a few of the cases of this lesion which have been put upon record.

1. A young married woman was seized, ten days before coming under Dr. Duncan's care, with rigors, followed by great anguish and pain under the sternum, with jactitation, want of sleep, rheumatism of the joints, pleuritic pains in the chest, cough, expectoration, dyspnœa, in-

227. *d.* Of the *Signs of Obesity and Fatty Degeneration of the Heart* little can be stated with confidence. Many writers suppose that the accumulation of fat, together with the softening of the muscular substance, embarrasses the organ, and ultimately arrests its action. Boerhaave thus accounted for the sudden death of a person whose heart was found loaded with fat. Portal (*Anat. Med.* t. iii. p. 75.) believed that obesity of the heart produces palpitations, dyspnœa, asthmatic affections, and even sudden dissolution; and Bonet, Senac, and Fothergill entertained similar opinions. — It has been also supposed that the softening and attenuation of the muscular substance attending the excessive deposition of fat in this organ, dispose to *perforation* or *rupture* of it. Morgagni and Bouillaud have recorded cases which favour this view. In one of the two interesting instances adduced by Mr. Smith, the sudden death was owing to rupture of the left ventricle. Kreysig remarks that, more commonly, obesity of the heart gives rise to no symptoms by which its existence can be inferred during life. M. Chomel, however, thinks that it often occasions dyspnœa and palpitations, and very probably faintings, or sinking; an irregular, weak, soft, small, and slow pulse; and anasarca, or œdema of the extremities, may also be produced by it.

228. *e.* An excessive deposition of fat under the pericardium, according to M. Bizot, is much more frequent in *females* than in *males.* He found, in 35 of the latter, the heart very much loaded with fat in 4; but, in 42 of the former, it was equally charged in 23 cases. That the accumulation of fat around the heart is not necessarily connected with, nor dependent upon, general obesity, is shown by the circumstance of 29 of the female cases having been thin or emaciated, and yet of these there were 14 instances of obesity of the heart. Of 13 females of a full habit, 9 presented an accumulation of fat around this organ. In 25 *phthisical females,* M. Bizot found a maximum deposition of fat in this situation in 11 cases, a medium quantity in 11, and complete absence of it in 3. In 11 phthisical men, this deposit was wanting in 6, and very scanty in 5. (*Mém. de la Soc. Méd. d'Observat.* t. i. p. 351.) I have observed an unusual accumulation of fat around the heart most frequently in habitual drunkards.

229. *f.* A *morbid deposition of fat* has likewise been observed on *the external surface,* and between *the layers of the pericardium;* sometimes to the extent of producing an injurious pressure upon the heart and great vessels; and even sudden death. Instances of this change have been noticed by Bonet, Senac, Godart, Morgagni, Meckel, Testa, Parry, Black, Kreysig, and Horn. That this deposition is entirely independent of general obesity, is confirmed by the remark of Otto, who states, that he has met with it although there was meagreness of other parts of the body. Fatty deposits on the pericardium have been incorrectly considered as causes of angina pectoris, by Fothergill, Wall, and Schramm; they are only contingently associated with it, or with neuralgia of the heart, in rare instances.

230. *g.* The *Treatment* of this lesion, in cases where the above indications, conjoined with a leucophlegmatic and corpulent state of the frame, render its existence probable, consists in whatever will improve the digestive and assimilative functions and the organic nervous energy. Tonics, chalybeate preparations; iodine, or iodine with iron; stomachic aperients; regular exercise in a dry open air; and abstinence from fat, oily, or rich articles of diet, and from stimulating beverages, especially spirituous and fermented liquors; constitute the chief means of cure — if, indeed, a cure be practicable.

231. viii. Of Adventitious Formations in the Heart and Pericardium. — *A. Of Earthy and Ossific Depositions,* little remains to be added to what has been already advanced, when considering them as occasional terminations of chronic inflammation (§ 119, 120.). But calcareous phosphates are sometimes deposited in circumstances which are by no means conclusive of the presence of inflammatory action, particularly in

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ability to lie down, followed by œdema of the extremities, the pulse having become weak, soft, and small. The treatment was antiphlogistic for some time after her admission into the hospital (on the eleventh day of the disease), and subsequently palliative. — She died six weeks after the attack. — On *dissection,* the pericardium was found universally inflamed, and firmly adherent to the heart. The lungs were agglutinated to the pericardium, and to the costal pleura. The heart was enlarged, and thickly covered with coagulated lymph, by which the pericardium adhered to it. Under this lymph, about two thirds of the structure of the heart was changed into condensed fat, which melted, stained paper, and swam in water: the remaining third had almost lost its muscular appearance.—The columnæ carneæ, in both the ventricles, were larger than natural. Ossific deposits were found in the aortic and mitral valves.

2. A gentleman, aged sixty, who had experienced attacks of gout, and had lived fully, was struck with apoplexy; for which he was treated, by Dr. Cheyne, in the usual manner. His pulse, however, continued extremely unequal and irregular; dropsy supervened; and he died, some weeks afterwards, of a recurrence of the apoplectic seizure with hemiplegia. — On *dissection,* the heart was found greatly hypertrophied. The lower part of the right ventricle was converted into a soft fatty substance; the upper part was remarkably thin, and gradually degenerated into this substance. The whole substance of the left ventricle, with the exception of the internal reticulated structure and columnæ carneæ, was converted into fat, the cavity being greatly enlarged. The valves were sound. The aorta was studded with steatomatous and earthy concretions. The principal peculiarity in the symptoms was the state of the respiration, which was irregular, and often suspended for a quarter of a minute. (*Dublin Hosp. Reports,* vol. ii. p. 216.)

3. Mr. Adams (*Ibid.* vol. iv. p. 396.) has detailed the case of a man, aged sixty-eight, of a full habit of body, who was subject to cough, and frequent attacks of an apoplectic nature. His breathing was irregular, and his pulse about thirty in a minute. He died from an apoplectic attack. — On *dissection,* the right auricle was much dilated. The right ventricle seemed composed of fat, of a deep yellow colour through most of its substance. The reticulated lining of the ventricle, which, here and there, allowed the fat to appear between its fibres, alone presented any appearance of muscular structure. The left ventricle was very thin, and its whole surface was covered with a layer of fat. Beneath this the muscular structure was not a line in thickness, and was soft, easily torn, and like liver. The septum of the ventricles presented the same appearance. In both ventricles, even in the lining fibres, yellow spots were seen, where fat had occupied the place of muscular structure. The whole organ was very light. The valves of the aorta were partially ossified.

4. A girl, during arthritic rheumatism, complained of various symptoms, many of which were referrible to the heart. Internal heat, with coldness of the surface, suppressed menstruation, cold perspirations, very feeble action of the heart, were complained of. Death took place after ten months. — On *dissection,* the lungs were found adherent to the pericardium and costal pleura. Yellowish white filamentous adhesions existed between the heart and pericardium. Two thirds of the muscular substance of the organ was converted into a greyish yellow mass of fat. (Dr. Simeon's *Op. cit.* Heidl. 1827.) — See, also, Dr. Elliotson *On Diseases of the Heart* (p. 32.), and the two cases recorded by Mr. Smith, in which free oil was seen in the blood; and in one of which, also, softening and rupture of the left ventricle were observed.

aged persons, and when other consequences of this action are not observed.—*a.* In many cases, a whitish patch appears, either in the fine cellular tissue uniting the enveloping membrane to the heart, or between the reflections of the internal membrane composing the valves, increases in thickness, and assumes more and more the characters of cartilage, especially in the latter situation. The morbid secretion giving rise to this patch ultimately becomes the seat of osseous or earthy deposits. M. ANDRAL divides the ossiform formations found in the heart into *three species*, as they are seated in the cellular, fibrous, or muscular tissue. — (*a*) That in the *cellular tissue* is the most common, the portion of it uniting the reflections of the internal membrane to the fibrous structure of the orifices and valves being most frequently thus altered. The calcareous phosphates are deposited in the cellular tissue, in minute grains, or in considerable masses, separating and compressing the surrounding textures. They are more rarely met with in the tissue connecting the muscular fibres; and they there form either isolated masses, or are connected with the deposits formed around the orifices. — (*b*) The *fibrous tissue* frequently also becomes the seat of the osseous deposit, and chiefly in three points: — 1st. In the tendinous zone encircling the left auriculo-ventricular orifice; — 2d. In the fibrous structure of the valves; — and, 3d. In the tendons of the mitral valve. — (*c*) The third species is the most rare. Indeed, it is doubtful whether the *muscular fibre* ever becomes the seat of this alteration. It seems more probable that the deposits, in the connecting cellular tissue, by their bulk, compress or partially destroy the muscular structure, than that this structure is converted into bone. The rare instances on record, especially those adduced by BURNS, RENAULDIN, and others above referred to (§ 119.), are most probably merely proofs of the partial destruction of the muscular tissue in the seats of the excessive osseous or calcareous formations.

232. *b.* The *pericardium* very rarely presents patches of the cartilaginous and osseous transformations. Instances, however, of the former have been recorded by BOERHAAVE, RIOLAN, HAUTESIERK, MORGAGNI, SAVIARD, OTTO, and TESTA; and of the latter have been observed by AURIVILLIUS, SAVIARD, WALTER, HALLER, PASTA, SENAC, PROST, RAYER, LAENNEC, and ABERCROMBIE, in the fibrous or in the serous layer. — Fibro-cartilaginous and osseous concretions are still more rarely found loose in the cavity of the pericardium. They have been detected only by LANZONI and OTTO; and have probably had their origin in peduncular tumours, which had subsequently been broken off.

233. *c. Signs.* — LAENNEC supposed that cartilaginous or osseous formations in the substance of the heart may be recognised, when very considerable, by an augmentation and modification of the sound. That a morbid sound will be heard when the orifices and valves are implicated, cannot be disputed; but the phenomena consequent upon these changes, when confined to the body of the organ, have not been observed with any precision. In a case noticed by M. ANDRAL, the suppositions of LAENNEC were not confirmed. It is unnecessary to add that these lesions are altogether beyond the reach of *treatment*.

234. *B. Tubercular Formations* have been very rarely found in the muscular structure of the heart. M. LAENNEC met with only three or four cases; but OTTO and BOUILLAUD never saw one. M. ANDRAL remarks, that the heart is one of the organs in which tuberculous deposits are most rarely observed. Instances, however, are recorded by HILDANUS, BONET, MORGAGNI, PORTAL, AUTENRIETH, SPENS, LAWRENCE, BAYLE, MACMICHAEL, and ELLIOTSON, at the places referred to below. In a man, aged 34, who complained of pain in the chest, cough, inability to remain in the recumbent posture, and subsequently of irregularity of pulse and palpitations, hypertrophy of the left ventricle, and tubercular formations in the muscular structure, were found after death. (*Cat. of Prepar. in Museum Fort Pitt, &c.* p. 38.) In an aged man, who died of pulmonary consumption (*Dub. Med. Journ.* 1833), a tubercular mass was found in the parietes of the left auricle obstructing the trunks of the pulmonary veins. M. SAUZIER detected, in a man who died of tubercular disease of the lungs, pancreas, &c., tubercles in a crude state in the walls of the auricle, the pericardium being adherent in the situation where they existed. Most of the cases of this lesion on record have occurred in persons who were labouring under extensive tubercular disease of the lungs and other organs: many of them have not been observed with any degree of precision; and the anatomical descriptions have generally been very loosely given. — Tuberculous productions have been found also in the internal surface of the *pericardium*, by MUSGRAVE, HALLER, VOIGHTEL, BAILLIE, OTTO, and others.

235. *C. Watery Cysts* and *Hydatids* have been detected both in the substance, and on either of the surfaces, of the heart. — *a.* Simple *cysts* have not infrequently been confounded with hydatids; the former having been described as instances of the latter formation, especially some of those mentioned by BONET, RUTTY, MORGAGNI, HUERMANN, SALZMANN, CLOSSIUS, and others. PORTAL found several hydatids on the base of the heart; MECKEL and BERNHARDI, large hydatid sacs on the left ventricle; PRICE, a large single hydatid in the muscular substance, in a boy who died suddenly; ABERCROMBIE, a bag containing two ounces of albuminous fluid on the left auricle; and TROTTER, two hydatids within the right ventricle. It is, however, doubtful whether these were really cases of hydatids. From the imperfect account given of the most even of these, it may be inferred, that some of them, at least, were merely instances of serous cysts. — M. ANDRAL remarks, that these cysts vary from the size of a pea to that of a large hen's egg. They are most frequently found between the external surface of the heart and pericardium; but they are sometimes seen on the internal surface of one of the chambers. In other cases, they are not visible on either surface, and it is only on dividing the muscular structure that they are detected. M. DUPUYTREN saw a number of these cysts imbedded in the walls of the right auricle, and protruding a considerable way into its cavity. M. ANDRAL found a cyst, as large as a walnut, in the walls of the left ventricle, which were slightly hypertrophied. In another case, he detected one on the free surface of the lining membrane of the right ventricle, attached to it by a delicate pedicle

of the same texture as this membrane. Dr. Elliotson mentions a case in which a number of globular cysts, containing a bloody fluid, were attached by pedicles to the fleshy columns.

236. *b.* Instead of simple cysts, true hydatids have been found in the heart, but in extremely rare instances in the human subject; they are more frequently met with, in this organ, in the lower animals. M. Andral has often seen them in the hearts of measly pigs, and only once in the human heart. Otto saw them protruding into the right auricle in one case; and in a man who died of diseased testes, he detected "a heap of hydatids on the Eustachian valve, hanging by several threads into the right ventricle." These, however, were probably only a cluster of simple cysts. Mr. South states, that, at St. Thomas's Hospital, there is a heart with a cyst on its apex, as large as a hen's egg, which was filled with hydatids. Watery cysts and hydatids have been found not only under that part of the pericardium reflected over the heart, but also either attached to the inner surface of the bag of the pericardium itself, or lodged between its layers.

237. *D. Tumours* of various kinds are noticed by the older writers as having been found in the substance of the heart. But, owing to their deficient anatomico-pathological knowledge, and to loose or defective descriptions, the exact nature of these is unknown. To these belong the cases recorded by Rhodius, Schenk, Columbus, and Bonet; and those collected by Lieutaud.—Tumours of a *steatomatous* nature have been observed by Penada, Fleisch, Sprengel, and Otto; and others, of a *melicerous* and *gritty* kind, by Morgagni, Walter, Arndt, and Cruveilhier. Otto states, that he has seen a flat gritty tumour in the substance of the right ventricle of an old woman; and five or six encysted tumours, the size of hazel-nuts, in the left ventricle of a young man. In an officer, who was the subject of chronic hepatitis, dropsy, &c., the slightest exertion producing severe palpitation, hurried and oppressed breathing, and a sharp irregular pulse, the heart was enlarged, and presented a large encysted tumour on the right auricle, the aorta being ossified at several points. (*Catal. of Prepar. in Mus. Fort Pitt, &c.* p. 36.)

238. E. *Sarcomatous Formations*, and *Medullary Sarcoma* or *Encephaloid Productions*, have also been found in both the heart and pericardium. Otto remarks, that *sarcoma* occurs—1st, as single little roundish knots, deposited between the layers of the valves;—2dly, as white condylomatous growths on the inner surface, and especially on the valves;—and, 3dly, as spheroidal, smooth, tolerably large, and solid growths, or true sarcoms. The *first* is common: and instances of the *second* are recorded by Lancisi, Bonet, Morgagni, Sandifort, Testa, Laennec, Desruelles, &c. Corvisart, Scarpa, and some others, consider them of a syphilitic nature; whilst Bertin and Bouillaud controvert this opinion. Otto states that he has met with them large, grape-like, or in the form of a cock's comb or cauliflower, both in syphilitic and in other persons. Bouillaud views these formations as the consequences of modified states of chronic inflammatory action. The *third* variety is most rare. It has been observed in either surface, and in the substance, of the heart, by Forlani, Blancard, Soemmerring, Otto, Rigacci, Nasse, and others. Meckel found fifteen of these productions, from the size of a pin's head to that of a hazel-nut, partly within, and partly without, the heart. Testa found them in the heart of a person long afflicted with syphilis. Mr. South states, that, at St. Thomas's Hospital, on the interior of the right auricle of the heart of a man, who had a sarcomatous growth in the nostrils, there were two similar productions, one as large as a bean, the other as a pea.

239. *F. Medullary Sarcoma*, or *Fungoid Disease*, in modified forms, may implicate the heart or pericardium, or both. As in the case of tuberculous deposits, it is observed principally in cases, where this disease had previously appeared in other parts of the body. Bartzky found it on the anterior and upper part of the heart; Segalas d'Etchpare, in a boy; Cruveilhier, in an old man; Ollivier, and several authors quoted by Otto, in persons advanced in life. In all these, there were similar tumours in other parts, and the muscular structure of the heart was chiefly affected. When this disease is seated in either the posterior or the anterior mediastinum, the pericardium may be penetrated by it, and the heart itself implicated. This was observed in the case of a woman whose arm had been amputated on account of this malady (Gerson and Julius, *Magaz. der Ausl. Liter. d. q. Heilk.* September, 1823, p. 199.). The pericardium was involved in it, in a case which lately fell under my observation. The disease was seated in the mediastinum, and extended not only to the pericardium, but also to the sternum and ribs; its nature being recognised during life. In a case published by M. Velpeau, encephaloid tumours were found in the substance of the heart, in the lungs, between the pleura and ribs, in the bronchial glands, under the mucous membrane of the stomach, in the duodenum, in the pancreas, and right kidney, in the liver to the number of some hundreds, between the tunics of the gall-bladder, in different parts of the peritoneum, on the upper surface of the brain, in the thyroid gland, and under the skin, and in the muscles of the right thigh. The aorta also was completely obstructed by fungoid masses.

240. M. Andral twice saw this disease in the right side of the heart. In the first case, the patient presented signs of hypertrophy of the left ventricle. In addition to this, almost the whole of the right ventricle and auricle were converted into a firm, dirty white substance, traversed by a number of reddish lines, and possessing all the characters of the encephaloid substance. The second case was that of a man of middle age, who had enjoyed good health till two years previously, when he became slightly asthmatic. He continued in this state for five or six months, when he was suddenly seized with the most excruciating pain, confined at first to the region of the heart, but soon extending over the left side of the thorax. His dyspnœa increased, and he had violent palpitations and vomiting. The pain abated after an hour, and the next day he was as usual. During the following year the dyspnœa increased, and the pain returned seven or eight times. He afterwards became much emaciated, had a peculiar sallow tinge, and evening exacerbations of fever. The attacks of violent pain were now frequent, but of short continuance. He had also occasional attacks of palpitation, but there was no stethoscopic

evidence of disease either in the heart or lungs. After some time he became œdematous, and died suddenly. The wall of the right ventricle was occupied by a large knotted tumour, extending from the apex to the base, projecting very much externally, and protruding internally into the ventricle. The encephaloid substance composing it was firm in some points, and soft and diffluent in others. (*Anat. Path.* t. ii. p. 347.)

241. *G. True Scirrhus and Carcinoma* of the heart are, according to OTTO, still doubtful. Where the evidence of either has been most conclusive, there has also been scirrhus or carcinoma of other parts. Open carcinoma of the heart can hardly exist, as death will take place before the disease can proceed to this stage. Most writers, especially foreign pathologists, have confounded true carcinoma with fungoid or encephaloid disease; and cases have been recorded as examples of the former, when they were really instances of the latter. Of this kind are the cases adduced by LAENNEC, VELPEAU, ANDRAL, CRUVEILHIER, OLLIVIER, &c.—BAYLE and CAYOL never met with an instance of scirrhus of the heart. I have seen scirrhus in the lungs and *pericardium* in one case, and in the pleura and pericardium in another, scirrhous and carcinomatous disease having long previously existed in other parts of the body. M. BILLARD found, in an infant only three days old, three tumours embedded in the heart, possessing the characters of scirrhus. I doubt, however, their being actually scirrhus. M. RECAMIER observed the heart partially converted into a substance resembling the skin of bacon in a person who also had cancerous tumours in the lungs. Cases of a more doubtful description are recorded by CARCASSONE and DUCHATEAU. RULLIER states that he found cancer in the heart of a person who had this malady in other organs; and a somewhat similar instance is recorded in the *Révue Médicale* (t. i. 1824, p. 272.).

242. *H. Melanosis* has also been found in the heart and pericardium; but, in all the instances of this kind on record, this production has existed also in other parts.—As to the *Treatment* of adventitious productions in the heart, it is unnecessary to offer any remarks.

243. ix. OF POLYPOUS CONCRETIONS IN THE CAVITIES OF THE HEART.—BARTOLETTI and PISINI were the first to impose the name of *polypi* on those concretions of lymph and fibrine which are sometimes found in the cavities of the heart and large vessels after death. KERKRING first contended that these concretions were different, in their nature and mode of formation, from polypi of the uterus and nasal fossæ, to which BARTOLETTI and PISINI had likened them. But with KERKRING originated the distinction of them into *false* and *true polypi*, — the former consisting of a *post mortem* coagulation of the fibrinous part of the blood, the latter presenting a consistent cellular or organised appearance, and being formed during the life of the patient. This distinction was first questioned by MORGAGNI, who denied the existence of true polypi of the heart, and in this opinion he was followed by LIEUTAUD, PASTA, and others. On the other hand, MANGET, MALPIGHI, PECHLIN, PEYER, F. HOFFMANN, and FANTONI maintained that the polypous concretions found in the cavities of the heart were to be regarded as the more immediate cause of death, and not as having been formed at the time of death. The opinions of pathologists, however, remained long divided on this point, until CORVISART, TESTA, BURNS, BERTIN, KREYSIG, LAENNEC, and others investigated it somewhat more closely, and ascertained that, although these concretions occasionally form about the time of death, or immediately afterwards, there are others of a different kind, which are produced during the life of the patient, and occasion very severe symptoms referrible to the heart, but not of a kind which generally admit of a precise diagnosis.

244. *A. Of the Formation and Kinds of Cardiac Polypi.*—Polypous concretions are most frequently observed in the right cavities of the heart, and oftener in the auricles than in the ventricles. This is explained by the circumstances which favour their production; especially the stasis of the blood in the auricles, the state of the blood when it reaches the right auricle, and the extension of inflammatory action from the venous trunks. These three principal causes are especially concerned in the production of *three kinds* of concretions.—In the heart as well as in the veins, and even in the arteries, the fibrinous parts of the blood may concrete — 1st, from a condition purely mechanical; — 2dly, from an altered state of the blood itself, especially from the passage of morbid matter into it; — and, 3dly, from inflammatory action.—Each of these, as being especially concerned in the production of three varieties of cardiac polypi, requires a detailed consideration.

245. *a. Simple fibrinous concretions — the false polypi* of former writers — are frequently found in the right cavities of the heart, and sometimes extend into the vena cava and pulmonary artery. They are occasionally entangled in the columnæ carneæ; but they have no organised or intimate connection with any part of the internal surface of the heart with which they are in contact. They consist of an inorganised accretion of the fibrinous and albuminous parts of the blood; are of an uniform colour, easily torn, and generally met with in patients who have died of chronic diseases; characterised frequently by a deficiency of the red particles of the blood, or, in cases of marasmus, great debility, or cachexy, and which have been accompanied by obstacles to the circulation, as from disease of the valves and orifices of the heart. These concretions may commence during the last moments of existence, or immediately upon dissolution. In cases of mechanical obstacle to the circulation through either the heart or lungs, the fibrinous parts of the blood may concrete in the right side of the heart so as to prevent the continuance of its action. The same result may also follow the remora or stasis of blood in the right auricle and vena cava, consequent upon extreme depression of the powers of life, or upon prolonged syncope, &c.; the concretion thus formed preventing the restoration of the heart's contractions. Under such circumstances, this variety of concretion may be the proximate cause of death. although formed so shortly before, especially in diseases of the heart, and during extreme vital prostration.

246. *b. Fibrinous concretions from the passage of morbid secretions into the blood.* — During languid states of the circulation, or when the fibrinous parts of the blood are disposed to coagulate, the passage of pus, or of the more consistent morbid

secretions, into the veins, occasionally determines or gives occasion to this act; the morbid matter carried into the circulation being the nucleus around which the fibrine concretes, especially in the situations, as the right side of the heart, most favourable to this occurrence. When a partial coagulation of fibrine is thus occasioned during the venous circulation, the concretions, at first small, often become entangled in the fleshy columns of the right side of the heart, and undergo changes arising — 1st, from the concentric deposition of additional layers of fibrine, as in the cavities of aneurisms; — 2dly, from their age or duration; — and, 3dly, from the effects they produce on the parts with which they are in contact. — (*a*) Upon dividing these concretions, the appearance of concentric layers of fibrine becomes manifest; and in the centre, either pus, or tuberculous matter, or a substance resembling a minute coagulum, is observed. — (*b*) The colour and consistence of these concretions depend chiefly upon their age. In the more recent cases, they nearly resemble those already described, and are soft or easily torn. Those of longer duration are more evidently disposed into concentric layers, more firm and fibrous, and generally of a paler tint; but varying from a greyish colour, to a greyish red or flesh-colour. — (*c*) When they are of considerable size, or of long duration, they appear to have compressed the fleshy columns in which they are entangled, and ultimately they become adherent, in one or more points, to the internal surface of the heart, in more immediate contact with them. This adhesion is manifestly owing to the irritation they have occasioned in this surface, and at these points, and to the consequent exudation of lymph, by which they become agglutinated, and more or less closely adherent. — (*d*) In this variety of concretion, there are neither blood-vessels nor vascular connections with the surface to which they become adherent, — circumstances readily explained by the modes of their production, and of their consecutive agglutination. At the same time, such adhesions are merely contingencies, and very frequently do not occur, especially in the more recent concretions. The form and size of these concretions also vary remarkably.

247. *c. Polypous concretions consequent upon internal carditis.* — Whilst the two preceding varieties of concretion are generally observed in the right side of the heart, that about to be considered is most frequently met with in the left; inflammation attacking this side of the organ, oftener than the right (§ 65. 68.). — This variety varies much in size and in firmness. It may not much exceed the granulations or excrescences described above (§ 66.), or it may be so large as to nearly fill one of the cavities. In its more recent state, it is generally amorphous, resembling concrete lymph, or the buffy coat of the blood, glutinous, and slightly adherent to some part of the internal surface, or of the fleshy columns or tendons of the valves. But, when it has been of considerable duration, it is more firm, fibrous, or cellulo-fibrous, in its structure, and more firmly adherent to the internal membrane, with which it seems as if continuous. In some cases, blood-vessels may be traced through this variety of concretion, and their communication with those of the heart's internal surface may be demonstrated. When this form of concretion is of considerable size, there is every reason to suppose that it is not altogether, or even chiefly, formed of the lymph exuded from the inflamed internal surface, as the quantity of lymph thus effused cannot be more than will give rise to the granulations, excrescences, or vegetations, already noticed (§ 66.) But the lymph thus exuded, during a languid circulation, or states of the blood favouring coagulation, attracts and disposes the fibrine to concrete around it; and polypi of great size, sometimes disposed in layers, as the second variety, may thus be formed. — The firmness and cohesion of these polypi vary considerably, but their cohesion has no reference to the intimate nature of their connection with the heart's surface; for, in some cases, where the polypus was very soft, vessels could easily be traced from the heart into it, and these so large as to admit of injection (RIGACCI, in *Bullet. des Scien. Méd.* Sept. 1828; BERTIN, *Traité des Mal. du Cœur, &c.* p. 448.); whilst in other instances the polypus has been firm, intimately adherent to, and apparently forming a continuous structure with, the surface of the heart, and yet the existence of blood-vessels was not apparent. That this variety of concretion originates in inflammatory irritation of some part of the internal surface of the heart, is proved by the history of the cases in which it has been met with, and by the appearances exhibited upon dissection. — From the foregoing division and description of these productions, the diversity of opinions which has long existed as to their formation will be readily accounted for.

248. *B. Of the Signs of Cardiac Polypi.* — About the end of the last century, polypi of the heart were considered a frequent occurrence, and many of the disorders of respiration and circulation were attributed to them. J. J. ROUSSEAU took a journey to Montpellier to be treated for this disease, and, according to M. BOUILLAUD, upon foot, which he could not of course have done if he had been the subject of it. — It is evident that the symptoms will vary according to the situation, size, and origin of these formations — to the degree to which they extend into or fill up the cavities of either side of the organ. MALPIGHI, SENAC, SAUVAGES, and BURSIERI have entered very fully into the diagnosis of these concretions, but no reliance can be placed upon what they have adduced respecting it. Even the more recent observations of LAENNEC, HARTY, and others have not much advanced our knowledge. M. BOUILLAUD remarks, that it is necessary for them to have attained so great a size as to notably impede the circulation, before they can be possibly recognised during life. They do not, however, equally impede the flow of blood through the cavities in all the situations in which they may be placed. The concretions which are attached to the valves, or to their tendons, the other circumstances being the same, cause the greatest interruption of the circulation. When they occupy the right cavities, as most frequently is the case, the blood is sent in diminished quantity to the lungs, and accumulates in the venous trunks, causing congestion of the liver, brain, abdominal viscera, &c.; effusions into shut cavities and cellular parts; and asphyxy from deficient aërification of the blood, if the supply of blood to the lungs be much lessened. When they form in the left side

of the heart, the phenomena are, in some respects, the same; but congestion of the lungs is a necessary consequence, with dyspnœa, effusions into the bronchi, or substance of the lungs, &c.

249. According to Laennec, the sudden supervention of an anomalous, confused, and obscure pulsation, in a patient who previously had presented a regular action of the heart, should lead to the suspicion of a polypous concretion; and if this disturbance takes place on one side only, this indication is almost certain. M. Bouillaud considers that the concretions consequent upon internal or external carditis, are indicated by tumultuous pulsations of the heart, with a dulness or obscurity of the attendant sounds, or with a simple, or hissing bellows sound; by oppression, dyspnœa, or orthopnœa, and extreme anxiety, followed by venous congestions, and leipothymia; and by coma, stertorous breathing, convulsive movements, an indistinct and very small pulse, and coldness of the extremities. When these phenomena are manifested in the course of an acute disease of the heart, particularly during internal carditis, in which there had previously been but little irregularity and oppression of the respiration and circulation, the existence of a polypous concretion is very probable, and especially if the sounds of one or more of the cavities are much diminished or obscure. — In chronic diseases of the heart, attended by habitual dyspnœa, the occurrence of an insupportable orthopnœa and anxiety, with obscuration of the sounds, restlessness, coldness and lividity of the face and extremities, and occasionally vomiting, also indicate the formation of concretions, especially if these symptoms have supervened without an obvious cause; and in this case it is very probable that the concretions exist in the right cavities.

250. *C.* The *Prognosis* and *Treatment* of polypous concretions require but few remarks: the former is always extremely unfavourable. Indeed, it is doubtful whether recovery ever takes place from them, — at least, when the indications of their existence are tolerably conclusive. M. Bouillaud, however, takes a more favourable view of the issue of such cases; and thinks that the more recent, and those which are not of large size, may be dissolved. This writer and M. Legroux suppose that attempts should be made to *prevent* the formation of these concretions in diseases of the heart — both in those which consist chiefly of interrupted circulation, and in inflammatory action. With this view they recommend small bloodlettings from time to time, and diluents. It is probable that the disposition of the fibrinous portions of the blood to concrete may be counteracted by the exhibition of mercurials, by the liquor potassæ and the subcarbonates of the alkalies, and particularly by the sub-borate of soda. This last substance I have found the most certain in preventing the coagulation of fibrine, and in dissolving lymph; and it may, therefore, be prescribed with advantage, not only in the inflammatory diseases of the heart, but also where here is reason to suspect the formation of polypous concretions.

251. x. Of Ruptures of the Heart. — *A. Seat and History of, &c.*—Rupture of the heart was first observed by Harvey. Lancisi and Morgagni showed that instances of sudden death were frequently owing to this cause. As examinations after death became more frequent, cases of this occurrence were more commonly met with; and at the present epoch of pathological research they are by no means rare. — Morgagni (*Epist.* xxvii. 10.) remarked that rupture of the left ventricle is more common than that of the right; and that this latter is more frequent than rupture of the auricles: this is confirmed by the particulars of the cases which have been since recorded. M. Ollivier states, that, out of 49 instances, the rupture was seated in the left ventricle, in 34; in the right ventricle, in 8; in the left auricle, in 2; and in the right auricle, in 3; and that, in 2 cases, both ventricles presented several ruptures. The results are, however, different in respect of ruptures occasioned by external violence. In 11 instances of this description, the right cavities were torn in 8; and the left in 3. In these 11 cases, the auricles were torn in 6.

252. In the above 49 instances of spontaneous rupture, the apex was found to be its seat, in 9; this lesion in the others being nearer the base of the organ. The directions of the lacerations were various: in some the laceration was transverse or oblique, — in others it was longitudinal or in the direction of the fibres, or of the axis, of the organ. In certain cases, it was extensive on the external surface, and very small internally. In other instances the reverse was observed. The laceration may occur obliquely through the parietes, and resemble a sinus, as remarked by Morgagni. It may even be incomplete, some of the stretched fibres still remaining and concreting the opposite edges (Rostan). It may also resemble the perforation made by a bullet. It may, moreover, involve only one or two of the muscular layers, without penetrating into the cavity; and it may be limited to a few fasciculi of fibres, or to the fleshy columns, or even to the valves.— When there is no apparent alteration of the tissue at the place of rupture, it is difficult to determine whether or not it has taken place from within outwards, or in the opposite direction. — The most singular circumstance, in the history of this lesion, is the occasional occurrence of two or more lacerations, in different degrees, in the same heart. M. Ollivier, upon examining into the particulars of the most authentic cases, found eight in which there were several ruptures, either in the same ventricle or in both. M. Rostan detected two lacerations in the left ventricle; Morgagni, three in the same situation; Portal, the same number in the same place; Dr. Ashburner, two in the left ventricle, and one in the right; M. Blaud found two penetrating the ventricles, two involving only the superficial layer of the left, and one the external layer of the right ventricle; and M. Andral observed five in the left ventricle, and a perforation of the stomach in the same patient.—Frequently, when the substance of the organ is torn, some of the fleshy columns corresponding to the rupture are also torn. In some instances the fleshy columns are alone torn, the parietes of the ventricles remaining entire. In this case the derangement of the circulation becomes extreme, especially if the tendinous cords attached to the free margin of the valves are ruptured (Ollivier). Instances of this kind are recorded by Corvisart, Laennec, Bertin, Adams, and others. Ruptures of the heart have

been arranged as follows by Dezeimeris:—1st. Rupture from external violence; — 2d. Spontaneous rupture without previous lesion of the tissues of the organ; — 3d. Ruptures consequent upon dilatation; — 4th. Ruptures with *probable*, but not with demonstrable, lesion;—5th. Ruptures owing to softening of the heart; — 6th. Ruptures from abscess;—and, 7th. Ruptures caused by ulceration, or perforation of the heart. M. Ollivier has adopted a somewhat similar plan to the foregoing in his treatise on this subject.

253. *a. Rupture of the Heart without previous Lesion*, or without demonstrable lesion, is comparatively rare. In the cases recorded by Ploucquet and Fischer the rupture was preceded by severe pain, continued or remittent, in the left shoulder, and about the margin of the left shoulder-blade, and shooting down the arm, and left side of the thorax, and attended by a sense of laceration, pressure, and anxiety at the præcordia and epigastrium, sometimes with numbness and prickings in the shoulder and arm. — In other instances, as in those published by Portal, Baron, and Andral, death has occurred without any previous ailment, excepting dyspnœa, which was observed only in the case recorded by Portal.

254. *b. Rupture consequent upon Narrowing of the Orifices*, with or without hypertrophy or dilatation of the cavities of the heart, is a more frequent occurrence than the foregoing. Morgagni has adduced several instances, in which the laceration was consecutive of alterations at the origin of the aorta. Haller has cited a similar case; and others have been recorded by Portal, Rostan, and Dezeimeris. In a case published by Chaussier, in which death occurred during a dispute, the aorta was found constricted at its origin by a cartilaginous tumour which surrounded it. There can be no doubt that an obstacle to the circulation at the heart's orifices will favour rupture of the cavity behind it; and that laceration may occur, although the parietes of the cavity are hypertrophied. Instances of this latter occurrence have been published by Morgagni, Rostan, and others. Morgagni supposed that, when the rupture is connected with hypertrophy, it takes place in that portion of the parietes which is the least thickened and resistant. But this is not always the case; for the rupture has been observed in the most hypertrophied part. M. Chomel supposes that, when this has occurred, the ventricle has been almost equally thickened and resistant throughout, and that the part torn, although the most hypertrophied, has been actually the weakest. If the sole cause of rupture were a distending force, or even the resistance furnished by the contents of the cavity to the contraction of its parietes, in forcing the contents onwards, then might the laceration take place in the weakest part; but the rupture does not always occur in this way; for it is reasonable to infer that the same circumstances as occasion increased action and consequent hypertrophy, will sometimes produce laceration, when their increase is rapid, or the obstacle to the circulation through the cavities of the heart insurmountable; and that hence the muscular structure is torn by its own excessive action at the very part where the contraction is most energetic.

255. *c. Dilatation* of the cavities might at first appear more frequently connected with rupture, than hypertrophy has been found to be, laceration of the parietes following the extreme or sudden dilatation of them; but this connection has been even less frequently observed than the preceding. Instances of it have, however, been adduced by Morgagni, Martini, and Schæffer. Local or partial dilatation might also appear frequently to terminate in rupture of the dilated part: but this is also a rare termination, as the adhesion of the part to the pericardium, or the formation of fibrinous layers in the interior of the sac, prevents it from being so easily torn as it otherwise would be. M. Ollivier remarks, that of nineteen instances of local dilatation, rupture occurred only in the three cases recorded by Galeati, Penada, and Bignardi.

256. *d. That Rupture should be favoured, or occasioned, by partial or general Softening of the Substance of the Heart*, will be readily conceded; and several cases are recorded in illustration of the occurrence.—In all these the softening was great, although varied in its characters: in some it has been denominated *gangrenous*, particularly by the older writers; in others *apoplectic*, by Cruveilhier (*Anat. Path.* fasc. iv.); and in others *gelatiniform*, or *senile*, by Blaud. Of the second of these varieties, instances have been adduced by Tengmalm, Corvisart, and Rochoux. M. Ollivier states, that the thesis of this last writer contains several cases of this kind of rupture.— Instances of the third variety of softening terminating in laceration are published, in the places referred to below, by Hazon, and others. In a case by S. Frank, this alteration appears to have arisen from lesion of the *nervi vagi*; and in one by Hodgson, the softening and atrophy seem to have followed obliteration of the coronary arteries.— Rupture has also been occasioned by the softening attendant upon fatty degeneration of the heart (§ 224.). Morgagni, Schmucker, and Adams. have recorded cases in which this form of softening had terminated in laceration.

257. *e. Abscess in, or Ulceration of, the Muscular Structure of the Heart has also been found to have terminated in Rupture.* — In cases recorded by Morgagni, Portal, Brera, Langlade, and H. Cloquet, *ulceration* had partially penetrated the parietes of one of the cavities, the remaining layer being torn by the distension, or resistance, of the contents of the cavity. Instances of *abscess* of the structure of the organ recorded by Erdmann and Mott, and quoted by Dezeimeris, terminated in a similar manner to the foregoing, — the termination admitting of the same explanation.

258. *f. The Rupture may be partial, or confined to one or more Layers, or muscular Fasciculi, or tendinous Cords of one or more Cavities*, as stated above, and as shown by Corvisart, and confirmed by Laennec, Bertin, Adams, and others. — In the three cases recorded by Corvisart, the rupture appeared to have been occasioned by violent physical efforts. Bertin detected rupture of one of the fleshy columns of the right ventricle, and attributed it to violent fits of cough. Laennec found one of the tendinous cords attached to the free margin of the mitral valve torn across; and Dr. Cheyne met with another instance of rupture of one of these cords in a person affected with dilatation and hypertrophy of the left ventricle. — Cases in which rupture of the *fleshy columns* and *tendinous cords* have occurred, have

likewise been observed by BOUILLAUD, TOWNSEND, and others.

259. *g. Ruptures of the Valves* are not infrequently met with, as a consequence of fragility arising from induration and ossification, or from softening caused by inflammatory action; but previous disease is not always necessary to the production of this rupture, especially when it is produced by external violence, or by sudden and violent physical efforts. When, however, it is consequent upon slighter grades of these causes, or upon mental emotions, previous disease of the valves, or of the orifices, or of the internal surface, of the heart may be inferred; otherwise they would have been inadequate to its production. If the rupture of the valve be partial, the patient may live a considerable time afterwards; but extensive chronic disease will be the result, owing to the local irritation, and to the imperfect function of the valve, particularly further structural change of the ruptured valve, dilatation, or dilatation with hypertrophy, of the chambers of the heart, &c. When the rupture is extensive, and has been favoured by existing structural change, death either follows almost instantly, or takes place in a short time. When the rupture is partial, the patient may live for a considerable time, with the symptoms of insufficiency of the valves (§ 76. 198.).

260. *F. Rupture of the Heart from external Violence* is not a rare occurrence. Contrary to what is observed in respect of spontaneous rupture, the laceration occasioned by external force is more frequently seated in the right, than in the left, side of the organ; and much more commonly in the auricles, than in the ventricles. As M. DEZEIMERIS has argued, it is very probable that the mode in which the rupture is produced by external injury, depends much upon the nature and seat of the injury. When the region of the heart, or the thorax, is the seat of the external violence, the rupture takes place in the cavities possessed of the weakest parietes, and in the most yielding points of these: but when the injury is of a kind to prevent the heart from evacuating its contents, as in the case of a carriage-wheel passing over the trunk, or of any heavy body pressing upon the aorta, the muscular efforts of the ventricles to expel their contents, may occasion either a partial or complete rupture of them, or of the vessel at some point between the heart and the part pressed upon.

261. *B.* The *Causes of Rupture of the Heart,* especially the most material, and those connected with the pathological states of the organ, have been already stated, and explained under distinct categories. There are, however, various other causes which determine, aid, or accelerate these in their operation. Violent mental emotions, particularly anger, fright, terror, unexpected disappointments, distressing intelligence suddenly communicated, anxiety, &c.; sudden and violent muscular efforts, and laborious or prolonged physical exertions of any kind, particularly in constrained positions. The act of coition and straining at stool have often occasioned rupture; a very large proportion of the cases of it on record having been attributed to these causes. M. OLLIVIER states that rupture of the heart occurs more frequently in men than in women; but this is not satisfactorily determined. It is certainly more common in persons far advanced in life, than in the young. M. BLAUD considers the rupture that takes place in old age, as generally the consequence of softening of the heart. Several cases recorded by him, and by other writers, confirm this; and those adduced by CRUVEILHIER and SMITH further show, that softening terminating in rupture of the left ventricle is often accompanied, in old persons, with great accumulation of fat on the surface of the organ.

262. *C. Symptoms* and *Diagnosis.* — *a.* The cases hitherto recorded throw but little light on the diagnosis of this lesion. Some of these have furnished proofs of disease of the heart for a longer or shorter time: whilst others, up to the hour of death, had complained of no symptom indicative of any affection of the heart or large vessels. In the instances recorded by PLOUCQUET, OLMI, CHARPENTIER, and FISCHER, the patients complained, for a short time before death, of a violent pain in the left shoulder, extending to the arm, and occasionally to the whole side; attended, especially at last, with more or less numbness, and characterised by exacerbations and slight remissions. In some cases, inexpressible anxiety and pain have been felt in the præcordia and epigastrium, with cold extremities and cramps, shortly before dissolution. In the majority, rupture has produced instant death; but in some this has not been the case. In the instance adduced by J. FRANK, life was prolonged twelve hours, probably from a coagulum filling up the laceration for a time. In a case recorded by RUST, the rupture was produced by the passage of a carriage-wheel over the chest, and was seated in the right auricle; yet the patient survived fourteen hours.

263. In most of the cases in which the rupture is preceded by violent pain, M. OLLIVIER thinks that it is produced gradually, from the successive laceration of several layers or fasciculi of muscular fibres; and that the pericardium becomes only gradually distended by the effused blood. Where the laceration and aperture are at once large, a copious effusion instantly occurs, fills the pericardium, and abolishes the contractions of the organ.

264. *b.* When the rupture is seated in the *partitions between the auricles or ventricles,* a fatal result may not very rapidly occur. In this case, the venous may be mixed with the arterial blood; although this may take place only to a small extent. — *c.* In the three cases of *rupture of the fleshy columns* detailed by CORVISART, a sudden oppression and sense of impending suffocation was the first symptom complained of. The pulse became unequal, irregular, and intermittent; and the pulsations of the heart confused. This state of distress and anxiety may continue for some days, before it terminates in death; or it may endure much longer, and be accompanied with various signs of organic disease of the heart. — *d. Rupture of the valves* will necessarily be attended by much irregularity or disorder of the circulation, and by a simple, or hissing, or musical bellows sound. (BOUILLAUD, FARRALL.)

265. As the *diagnosis* of rupture of the fleshy columns and valves of the heart, in the present state of our knowledge, is very imperfect; and as the signs of rupture of the parietes of one of the cavities are equivocal; nothing can be adduced as

to the *Treatment* of these lesions. Indeed, in most instances, medical interference will be quite unavailing; and even as much mischief as benefit may result from it.*

266. xi. ALTERATIONS OF THE BLOODVESSELS OF THE HEART.—The coronary vessels are more or less enlarged in hypertrophy of the heart, and diminished in atrophy. Some writers have supposed that the smallness of the vessels in the latter lesion is actually the cause of it; but the state of the vessels is solely dependent upon the nutrition of the organ. PORTAL (*Anat. Méd*. t. iii. p. 74.) found the coronary veins dilated and varicose; and the larger trunks have contained polypous concretions (KREYSIG). The coronary trunks, both veins and arteries are always very much, and progressively, enlarged with the accession of age, as shown by M. BIZOT. The most common alterations, however, of the cardiac vessels are cartilaginous and ossific formations in the *arteries*. These, especially the ossific deposition, may consist merely of small isolated patches, or they may nearly or altogether surround the vessel. Ossification may extend along the greater part of an artery, or to two or more. Generally, the canal of the vessels is uninterrupted, although the parietes have become quite inert. Cases, however, have occurred in which the canal has been obliterated. Instances of extensive ossification of the cardiac arteries have been recorded by PARRY, RING, PORTAL, HODGSON, and others; and have been usually found associated with softening, flaccidity, or some other change in the nutrition of the organ. Angina pectoris has been supposed to depend upon this change; but numerous instances of ossification of the coronary arteries have been met with without this complaint, or, indeed, any symptom referrible to the heart, having existed.

267. xii. COMMUNICATION BETWEEN THE SIDES OF THE HEART. — This lesion is most frequently congenital, or the result of malformation, or imperfect development of the organ. It occasionally increases suddenly about the period of puberty. M. BERTIN (p. 436.), and M. BOUILLAUD (t. ii. p. 564.), however, believe that it is not unfrequently a consequence of ulcerative perforation; whilst M. LOUIS maintains that it very rarely arises from this latter cause. The communication may exist through the interauricular, or through the interventricular partition, or through both at the same time. BOUILLAUD remarks that, in many cases, the *opening in the interauricular partition* is a persistent state of the *foramen ovale*; but, in others, that it is consequent upon ulceration, particularly when it occupies a situation different from that in which the oval foramen is always found, and when there are more than one perforation. The communication in this situation is generally by a rounded opening, with smooth, sometimes thick and tendinous, margins, commonly of from four to six lines in diameter, but sometimes of nearly double this size. The *perforation of the interventricular partition* is found in various situations, but most frequently at the junction with the partition of the auricles, and towards the insertions of the pulmonary artery and of the aorta. The form of the openings is commonly round, and the diameter is the same as those of the interauricular partition, the margins presenting the same polished and fibrous appearance.

268. The state of the valves and orifices of the heart, in cases of communication between the opposite cavities, is important. Of fifteen cases, detailed by BOUILLAUD, the valves were indurated, thickened, corroded, or perforated in twelve; and, in ten of these twelve, the orifices to which these valves belonged were more or less contracted. In eight of the twelve cases, these lesions affected the right; in three, the left valves and orifices. In five of the eight cases, they were seated in the pulmonary valves; in two, in the tricuspid valve; and, in one, in both the pulmonary and tricuspid. Of fifty-three cases of cyanosis noticed by M. GINTRAC, similar lesions to the above were found in twenty-seven; and in all these latter, they were seated in the right side of the organ; twenty-six being at the orifice of the pulmonary artery, and one only in the auriculo-ventricular orifice. The contractions of the orifices and lesions of the valves, in these cases, did not differ from those described above (§ 67,213.). The greater frequency of the narrowing of the right orifices, particularly that of the pulmonary artery, in cases of communication between the opposite cavities, is deserving notice. This lesion M. LOUIS considers to be congenital. M. BOUILLAUD believes it to be, in some cases, caused by inflammatory action.

269. In eleven of the fifteen cases given by M. BOUILLAUD, the heart was enlarged, dilatation, with hypertrophy, having existed in the right side. Dilatation of the right auricle was observed in ten cases; and, in most of these, the parietes of the auricle were also thickened. Hypertrophy of the right ventricle was met with in ten cases; and, in four of these, the hypertrophy was concentric. The left side of the heart presented nothing anormal, excepting the induration of the valves, and narrowing of the orifices, in the three already noticed (§§ 268.). In the twenty cases reported by M. LOUIS, nearly the same appearances as in those of M. BOUILLAUD were observed. Dilatation of the right auricle existed in nineteen, six times with hypertrophy, and twice with thinning of its parietes. Dilatation of the right ventricle was observed in ten, hypertrophy in eleven, and both dilatation and hypertrophy in five instances; whilst, on the left side, dilatation of the auricle occurred thrice, that of the ventricle four times; and hypertrophy of the former twice, and that of the latter thrice only. (*See* BLUE DISEASE, § 8.)

270. In some instances, communication between the opposite sides of the heart is associated with other *lesions of malformation*; as the connection of the aorta with the right ventricle (RIBES), or with both ventricles (LOUIS), the persistence of the ar-

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* The only instance on record, showing the possibility of recovery, more or less partial, from rupture of the heart, has been published by ROSTAN; but some mistake may have existed as to the morbid appearances. The case is, however, very interesting. — A woman had experienced, fifteen years previously to death, a violent pain in the præcordia and epigastrium, extending to the back, and returning at intervals. She was afterwards subject to palpitations, followed by syncope. Her death was sudden. The pericardium contained blood effused in its posterior part, but was adherent to the heart anteriorly by several albuminous layers. On removing it, an irregular rupture, an inch and a half in length, and quite recent, was found; but, to the left of this, and at a distance of six lines, the substance of the organ was destroyed, and replaced by a fibrinous concretion, entirely similar to those found in aneurismal sacs, and intimately connected with the structure of the heart. The ventricle was thinned in this situation. The latter appearance was attributed to a rupture which had taken place at a long bygone period.

terial canal, &c. (See BLUE DISEASE, § 8.) The state of the *pericardium* has been noticed in a few only of the cases of this description; and in these alterations depending upon chronic pericarditis, and effusion of a serous fluid, were chiefly observed.

271. The *symptoms* of the lesion under consideration are generally equivocal; for, as it is generally associated with disease of the valves and orifices, and with dilatation and hypertrophy of the corresponding chambers of the organ, it becomes difficult to separate the phenomena actually depending upon these lesions from those arising from the communication between the opposite cavities. The palpitations, dulness on percussion of the præcordial region, the purring tremor, the bellows or saw-sound, the faintings, sinkings, oppression, &c., the irregularity and smallness of the pulse, the venous and serous congestions, &c., observed in these cases, are manifestly owing to these associated lesions. That more or less admixture of the venous and arterial blood results, in consequence of the communication, must be admitted. M. LOUIS thinks that it takes place chiefly on the entrance of the blood into the communicating cavities, and on the departure of the blood from these cavities, when the natural orifice is more or less constricted.

272. Blue discolouration of the skin (See BLUE DISEASE) has been attributed to this communication; but it is not always observed, and it is rarely universal. Sometimes it is not remarked, even in the countenance, till the last period of the patient's life. This change of colour is to be attributed as much to the obstacle to the circulation of the venous blood, as to the communication between the opposite sides of the organ; and this communication has generally existed a considerable time before the health has been very remarkably affected. The symptoms assigned to this alteration, particularly blue discolouration, leipothymia, great sensibility to cold, oppression and suffocation in the thorax, are chiefly an aggravation of those observed in other diseases of the heart, and are often wanting in this. According to M. LOUIS, the symptoms most to be depended upon is, a sense of suffocation, occurring sometimes periodically, but always frequently, accompanied or followed by leipothymia, and with or without blueness of the skin, and occasioned by the slightest causes. Admixture of the red and dark blood, even to a considerable extent, at least in appearance, seems not incompatible with a tolerably prolonged existence, nor with development of the intellectual faculties. It has no manifest effect upon intercurrent diseases. The existence of a communication between both sides of the heart, even when it becomes somewhat manifest, is not so dangerous as the blue disease. The former may not give rise to serious phenomena; the latter indicates that the communication is accompanied with a dangerous interruption of the circulation through the right side of the heart, or some equally dangerous lesion. As to the *treatment* of this alteration, I cannot add any thing to what I have stated in the *article* BLUE DISEASE (§ 12.).

273. VI. DISPLACEMENT AND PRETERNATURAL POSITIONS OF THE HEART. — The situation of the heart is sometimes anormal, owing to *malformation*; but my limits will not admit of an account of the various alterations of the *position*, and of the *form*, of the organ, observed as a *congenital vice*. Those who are desirous of obtaining information on this subject will find it in the works of HALLER, MECKEL, OTTO, BRESCHET, BOUILLAUD, and others, referred to at the end of this article. The *position* of the heart may be anormal in several ways, from malformation; it may be placed externally to the thoracic parietes, or internally in the abdominal cavity, below the diaphragm, or in the right side of the thorax; and the vice in situation may be associated with other anomalies, either in the circulating system, or in the position and form of the adjoining viscera, or in both. These, however, are matters calculated rather to excite curious speculation than to lead to practical inferences. But with *true displacements* of the heart, or *alterations of position after birth*, the case is different. These displacements arise from diseaes, or injury of the organ itself, or of adjoining parts; and the extent of the alteration, and the manner or mode of its occurrence, in such cases, are matters of real practical importance.

274. *a.* The apex of the heart may be turned altogether to the *left side*, without further alteration of position, or it may be raised at the same time somewhat higher in the thorax, by excessive hypertrophy of the organ. — *b.* The heart may be *pushed downwards*, by an aneurism of the arch of the aorta, or by some other tumour pressing upon it. Cases of this kind have been recorded by LANCISI, MORGAGNI, and OTTO. — *c.* True *prolapse*, or dragging down of the organ, from increased weight, and weakness of the parts supporting it, is very rare; but it has been noticed by LEIDENFROST, SENAC, ZULIANI, PACHIONI, OTTO, and TESTA. In this form of displacement, the diaphragm is carried before the heart, a convex tumour thereby invading the abdomen. — *d.* The heart may be pressed *unusually high* in the thorax, or towards the neck, by enlargement of the abdominal viscera, by large hydatid cysts, by inordinate distension of the stomach or colon, by excessive dropsical effusion into the peritoneum, by tumours of the spleen, liver, or other parts, and by aneurism of the descending aorta. Instances of these occurrences have been adduced by the writers referred to hereafter. One of the most common causes of this displacement is aneurism of the descending thoracic, or of the abdominal, aorta. In such cases, a double pulsation is felt in the aneurismal tumour, as in those recorded by Drs. GRAVES and STOKES.

275. *e.* The heart is not unfrequently *pushed over to the right side* by various alterations in adjoining viscera. It must, however, be recollected that this organ may be situated towards the right side, owing to original conformation, or to transposition of some or of the whole of the viscera. Instances of this are, however, very rare; but several have been adduced by the writers mentioned above (§273, 274.). The alterations causing the displacement of the heart to the right side, are, destruction or condensation of the right, and hypertrophy of the left lung, as in the case recorded by Dr. ABERCROMBIE; dropsical effusion into, or encysted dropsy of, the left thorax; pneuma-thorax of the left side; collections of pus or of blood in the left pleural cavity; tumours of various kinds; diaphragmatic herniæ; and curvatures of the spine. Dr. STOKES mentions a case in which the heart was thrust by a blow of a wheel to the right side, where it continued long afterwards to pulsate.

276. Several instances of displacement of the heart to the right thorax have been observed by me. In all

these, it arose from the effusion of fluids, of various kinds, in the left pleural cavity: in one case, from the effusion of blood from external injury, with fracture of the ribs; in three, from pleuritis of the left side, terminating in serous effusion; in two, from empyema; and in two, from pneumo-thorax. In one of these latter, consequent upon tubercles, the patient had not been long ailing. The passage of air into the left pleural cavity was sudden and rapid. I saw him within two hours from the commencement of the distress consequent upon it, and immediately detected the pulsation of the heart on the right side.

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HEPATITIS. — See Liver, Inflammation of.

HERPETIC ERUPTIONS. — Syn. *Herpes* Ἕρπης (from ἕρπειν to creep), Galen, Dioscorides; *Formica*, Avicenna. *Cytisma Herpes*, Young; *Herpes*, Sauvages, Linnæus, Willan; *Serpigo*, Auct. var. *Ecphlysis Herpes*, Good; *Dartre, Herpe*, Fr.; *Die Flechte, Zittermal*, Germ.; *Erpete*, Ital.; *Vesicular Tetter, the Serpigo*, Fret.

Classif. — 4. *Class.* 8. *Order* (*Cullen*). 6. *Class.* 3. *Order* (*Good*). 6. *Order.* 3. *Genus* (*Bateman*). III. Class, I. Order (*Author*, in *Preface*).

1. Defin. — *An eruption of vesicles, in distinct irregular clusters, upon inflamed bases which extend somewhat beyond the margin of each cluster; attended by tingling, concreting into lamellar scabs, and not contagious.*

2. A genus of eruptions, characterised as just stated, has been very accurately described by Willan, Bateman, Biett, and Rayer, under the name of *herpes*. This designation represents, according to the above definition, affections in many respects different from those comprised under it by Lorry, Turner, Alibert, and others; and is employed by the former writers in a more rigorous sense. Yet the several *species* enumerated by Bateman and Rayer are manifestly too numerous, some of them being merely varieties arising out of the forms which the clusters of vesicles assume, and of the situations in which they are often observed. In this opinion, I am supported by M. Biett and Dr. A. T. Thomson, who have arranged them accordingly.

3. *Herpes* is an inflammatory affection, chiefly of the vascular rete of the skin, causing the effusion of a thin fluid, which elevates the cuticle into groups of small vesicles. This affection occurs generally in circumscribed patches, the skin retaining its natural aspect in the intervals; passes through a regular course of increase, maturation, and decline; and terminates usually in from ten

to fifteen days, but is sometimes prolonged to twenty-one days. It is frequently preceded by constitutional disorder, and is sometimes critical of other diseases. The vesicles are filled at first with a colourless and clear fluid, which gradually becomes milky and opaque, and ultimately concretes into thin scabs; but occasionally a discharge of it takes place, and ulcerations follow. Tingling or pricking pains sometimes attends the eruption. In some cases, as the crusts fall off in one part, fresh vesicles arise in the vicinity, and the eruption thus creeps over a large portion of the surface and its duration is thereby prolonged. — Adopting the division of M. BIETT and Dr. A. T. THOMSON, I shall consider the forms of Herpes as follows: — *Species* 1. *Herpes Phlyetanodes;* — var. *a. H. Zoster; b. H. Circinnatus; c. H. Labialis; d. H. Præputialis.* — Species 2. *Herpes Iris.*

4. I. DESCRIPTION. — Spec. i. HERPES PHLYCTENOIDES. — CHARACT. — *An eruption of small transparent round vesicles, in irregular agglomerated patches, preceded and attended by slight constitutional disorder.*

5. This species occasionally appears on the forehead, cheeks, and neck, but more commonly on the extremities; and is often disseminated over different parts of the body. A sensation of itchiness, tingling, or painful smarting, or pungent heat of the part about to be affected, is followed by very minute and almost imperceptible red points, clustered so as to compose an irregular-coloured patch, varying from the size of half a crown to that of the palm. After some hours, or next day, a number of hard, shining, round vesicles, the size of millet-seeds, or a little larger, arise on the inflamed patches, and are filled with a colourless, or pale citron-coloured serum, or with a brownish serum in the aged or cachectic. The vesicles are grouped in irregular clusters, of different sizes, varying from a dozen to fifty vesicles, or more. To the primary cluster or clusters, others succeed; the integuments intervening between the clusters preserving their healthy hue. The tingling and smarting are increased by heat, and by the warmth of bed. The size of the vesicles generally increases, and some acquire that of a pea, or become larger, apparently by the confluence of several into one. In about twenty-four or thirty-six hours, the fluid in the vesicles becomes milky, in the smaller, and brownish, or sanguinolent, in the larger. The whole decline or break from the sixth to the tenth day; but new clusters often continue to arise. The fluid and detached cuticle are rapidly turned into yellowish or blackish scabs, which are loosened or fall off from the tenth to the fifteenth day, or even later. The surface affected retains for some time a red or livid colour, and continues the seat of prickings or smarting. The fluid of the very minute vesicles is occasionally absorbed, and thus some of the clusters miscarry. In rare cases, the clusters have a circular form, and the areas of the groups are covered by distinct vesicles—the *Nirles.* This form is attended by severe pain, and much constitutional derangement.

6. This species of herpes is generally preceded by disorder of the digestive organs, flatulent distension or oppression at stomach; by thirst, heat, and slight febrile disturbance; and by an unhealthy state of the excretions. The constitutional disturbance is not relieved by the eruption, but often aggravated by the heat and tingling of the successive groups of vesicles. This eruption usually assumes an *acute* form, and *terminates* within three weeks, but it sometimes becomes *chronic*, one crop of vesicles succeeding another. It may appear in persons labouring under other diseases, especially of the biliary organs, and of the digestive mucous surface.

7. *A. Herpes Zoster.* — SYN. Ζωστηρ; *Zona*, Scribonius Largus, Sagar; *Herpes Zoster*, Hoffmann, Willan; *Erysipelas Zoster*, Sauvages; *Shingles.* — This variety differs from phlyctenoid herpes in the size of the vesicles, in the seat of the eruption, and in the mode in which the clusters successively appear and extend themselves. The vesicles are closely agglomerated, but distinct; they increase to the size of pearls in twenty-four hours; and are filled with a limpid transparent fluid. The inflamed bases are irregular and large, extending some distance beyond the vesicles. The most frequent seat of this variety is the trunk, particularly the abdomen and lower part of the thorax. As the patches successively appear, they extend either obliquely round the waist, or across the shoulders; or from the shoulder to the arm; or from the nates obliquely down the thighs. They very rarely advance perpendicularly. The right side is more frequently affected than the left; the eruption rarely or ever appearing on both sides at once. Of fifty-three cases, RAYER observed thirty-seven on the right side.

8. Shingles are preceded by febrile rigors, quickened pulse, headach, thirst, and disorder of the digestive organs, and of the excretions. Pains darting across the chest, scalding heat, smarting or stinging pain in the part about to be the seat of eruption, are also often present; but frequently the antecedent and attendant constitutional disturbance is but slight. The eruption consists at first of patches of shining or silvery vesicles. These usually extend, in the form of a zone; but sometimes they appear at the opposite extremities of the zone, and join by successive patches extending towards the centre. The vesicles of the individual groups reach their utmost size, which seldom exceeds that of a pea, in three or four days. The patches are then more florid, and the redness extends a few lines beyond their circumference. At the end of five or six days, the fluid of the vesicles presents an opalescent hue, becomes sero-purulent, or even purulent, if the inflammation run high. The redness of the base is now deeper, or more livid, and some of the vesicles subside; others break even before this, and, the cuticle being detached, suppurate for a few days: but the greater number dry up, and form yellowish, or brownish lamellar, or prominent, scabs, which in ten or twelve days fall off, leaving the skin red and tender. In old debilitated, or cachectic persons, the vesicles often enlarge into *bullæ*, soon break, suppurate, or even ulcerate. The greater number of the vesicular groups of zonæ arise in succession; and, while those which have first appeared are becoming purulent, or drying up, others arise in the intervals, and pursue the same course. In from ten to twenty-one days, the whole of the incrustations are detached; but, when the vesicles are very large, or confluent, and the skin much inflamed, ulceration sometimes takes place,

and the disease is much longer protracted. In some cases, the pain described above continues for a time after the eruption has healed. The febrile symptoms often subside when the eruption is completed, but these symptoms are sometimes aggravated during its progress; the deep-seated pain in the part occasionally continuing to the last.

9. *B. Herpes Circinnatus,—Ringworm, Vesicular Ringworm* — is characterised by small, round, and crowded vesicles arranged in the form of rings. It appears on the neck, cheeks, forehead, arms, shoulders, and other places, in red, oval, or circular spots, of half an inch to two inches in diameter; and is attended by itchiness and smarting. The redness is much less in the centre than towards the circumference of the smaller spots, and is entirely wanting in the areas of the larger patches. Small vesicles, whose bases are slightly inflamed, containing a transparent fluid, rapidly appear in the circumference of the patches, the areas becoming temporarily of a slight red colour. From the fourth to the sixth day of the eruption the redness declines; the vesicles become turbid, and either burst or are covered with thin brownish incrustations, which are detached between the tenth and fifteenth day, a slight desquamation at the same time taking place from the centres of the patches, when the redness had extended to them. Patches of small size often have the fluid in their vesicles absorbed, the cuticle exfoliating. The duration of this eruption does not extend above the time just specified; but it may be protracted very much longer, when the eruption of the vesicular rings is successive. In some instances the areas of the patches are covered with minute vesicles; and when this is the case, the patches spread, and extend over a considerable space. M. RAYER and Dr. A. T. THOMSON state that this eruption is is seldom accompanied by any constitutional disturbance. This, however, does not agree with my experience. The general disorder is certainly very slight, and thus escapes detection; but, in most cases, the digestive canal is more or less deranged, and the evacutions morbid.

10. *C. Herpes Labialis — herpes of the lips* — is similar to the varieties already described, as respects the characters and progress of the vesicles, the only differences resulting from situation. It may be seated, either in the lower, or in the upper lip, or it may extend around the mouth. It is sometimes confined to the angles. It usually appears outside of the true lips, extending to the line of union between these and the skin. Sometimes patches of the eruption also appear on the cheeks and alæ of the nose. — In three or four days, the vesicles contain a yellowish purulent fluid. The lips swell, and as the disease proceeds, become hard, sore, stiff, hot, and smarting. After the vesicles break, and crusts form, and especially if the latter are prematurely removed, the redness increases, the surface becoming harsh or cracking; and the disease is often protracted. — When it is consequent on disorder of the digestive organs, it often assumes a chronic form. — This variety is generally consequent upon a febrile state of the system and disorder of the prima via. The patient complains of headach, chills, pains in the limbs, lassitude and want of appetite for some time before the eruption appears. The alvine evacuations are usually morbid, and the abdomen often tumid or tender. Sometimes this variety is critical of catarrhal complaints, of agues, and of several acute diseases attended with pyrexia. It is occasionally preceded, or accompanied by vesicles or aphthæ in the mouth.

11. *D. Herpes Præputialis* (*Aphthæ præputii vel vulvæ — Ulcuscula præputii*) — is characterised by one or more groups of small, round vesicles, on the outer or inner surface of the præpuce, or on both, that usually disappear in about a fortnight. It begins in one or several patches of from four to eight lines in diameter, which are circumscribed, and of a vivid red; and rarely appears on the glans penis. The eruption of vesicles is preceded by itching and tingling of the part, which is slightly inflamed and tumid. Small vesicles arise between the second and fourth day, containing a transparent serum, which, about the fourth day becomes turbid, and afterwards puriform. On the exterior, they dry and form scabs, from the fifth to the seventh day, of a lamellar or conoid form; and, if the part be not exposed to irritation or friction the healing process proceeds underneath the scabs which are thrown off from the seventh to the tenth day. When the eruption occurs on the inner surface of the præpuce, the vesicles generally break as early as the fourth day, and the inflamed rete becomes exposed, forming a superficial sore, which has been mistaken for chancre.

12. This variety of herpes not infrequently occurs on the *labia vulvæ* of women affected with leucorrhœa, or during pregnancy and after delivery; and the eruption may be either internal, or within the labia. In these cases, the characters and progress of the vesicles, and of the consecutive sores, are the same as already described.

13. ii. HERPES IRIS. — CHARACT. *Small groups of vesicles surrounded by four concentric erythematous rings of different hues.*

14. This species was first arranged under herpes by Dr. WILLAN. It was accurately described by Dr. BATEMAN. It occurs most frequently on the back of the hands, olecranon, knees, ankles, instep, and similar parts. It commences in small red spots, consisting of concentric rings of varying shades. These spots enlarge from two to about eight lines in diameter; and, in their centres, a yellowish-white, flattened vesicle appears from the second to the third day, surrounded by several others of a smaller size, arranged in a ring. This central vesicle is surrounded by a circle of a dull brown colour, this by a second nearly of the colour of the vesicle; this second by a third circle of a deeper red; and the third, by a fourth, formed on the seventh, eighth, or ninth day. This, the most external ring, is of a rosy tint, which passes insensibly into the colour of the healthy skin. The third is the narrowest of these rings; and they may all become covered with vesicles, but the first is most frequently so covered. From the tenth to the twelfth day the fluid of the vesicles is absorbed, or it escapes and dries into scabs, which are detached two or three days afterwards.

15. II. CAUSES. — The causes of the varieties of herpes are often very obscure; and consist rather of some anterior disorder of the constitution, characterised by deranged digestion and excretion, and by vascular irritation, than of direct agents. The truth is, that they are altogether symptoms of

pre-existing disorder of the system, implicating especially the digestive, the biliary, and excreting functions. They do not depend upon contagion, and they may occur several times in the same person. They are often an advanced symptom, which frequently proves critical, of catarrhal, febrile, or inflammatory affections. — *a. Herpes Zoster* is most commonly observed in persons having delicate and irritable skins, between twelve and thirty years of age; but it is also met with in the aged. It is most prevalent in summer and autumn; and is generally dependent upon derangement of the biliary organs and digestive canal. — *b. Herpes Circinnatus* is common in children, especially in girls of a delicate frame, with thin irritable skins, and often depends upon the same internal disorder as the foregoing. — *c. Herpes Labialis* is often consequent upon catarrhs produced by vicissitudes of temperature; but in its more chronic states it is usually connected with derangement of the organs of digestion. — *d. Herpes Præputialis* is frequent in middle aged men, or in those advanced in life. It sometimes accompanies stricture, or an irritable state of the urethra, or disorder about the neck of the bladder. More frequently it depends upon acrid secretions from the root of the glans. It is independent of the use of mercury; as it is also of affections of the urethra, although often connected with these affections. It is frequently symptomatic of chronic derangement of the liver and digestive tube. It is non-contagious. — *e. Herpes Iris* is most common in children and fair delicate females. It may also be considered as dependent upon internal disorder.—All the varieties of herpes occasionally appear after unwholesome articles of food, and other errors of diet; and after perturbations of the mind, especially when disorder of the digestive functions had previously existed.

16. III. Diagnosis.— Herpes was often confounded, by writers previous to Willan, with erysipelas, impetigo, and eczema. — *a.* It is to be distinguished from *Erysipelas*, by the numerous, small, clustering vesicles; by the healthy surface between the clusters; and by the absence of redness and tumefaction before the vesicles appear; and from *Pompholyx*, by the vesicles arising in groups or patches on an inflamed base. — *b.* Neither *Eczema* nor *Impetigo* assumes the purely vesicular form, nor runs the same course, within a limited time, nor forms the dry harsh scab, which characterises herpes. — *c. Herpes Circinnatus*, when appearing on the forehead, and at the roots of the hair, may be mistaken for *Porrigo scutulata*, but the vesicular form of eruption, the regular course it pursues, and the persistence of the hair, distinguish it from this affection. — *d. Herpes Præputialis* may be confounded with *syphilitic pustules* or *ulcers*. The common chancre commences by a single pustule, whereas the herpetic affection consists of a cluster of vesicles; the thick scabs of the former differing from the thin incrustations of the latter. When herpes is seated on the inner surface of the præpuce, and has passed into the state of excoriation, the diagnosis is more difficult. But the superficial clustering character of the sore is different from the deep ulcer of syphilis, with its hard elevated edges, and the small grey-coloured false membrane covering its bottom.

17. IV. Treatment.—*A.* This is nearly the same in all the varieties; and should be based upon the pathological dependence of the disease insisted upon above (§ 15.) Keeping the connection of the eruption with disorder of the digestive organs closely in view, a mild ipecacuanha emetic should be exhibited, and subsequently any gentle purgative, with magnesia or an alkaline carbonate. Afterwards a free use of diluents and abstinence are all that will be required in most cases. In the more severe attacks, especially of herpes zoster, additional means will often be called for. Where there is much antecedent or attendant fever, M. Rayer advises a moderate bleeding, or the application of a number of leeches to the anus, or around the seat of eruption. Neither of these is often necessary. When the evacuations are morbid, and the biliary functions impaired, a dose of blue pill, or of calomel, at bed-time, and a mild purgative, containing an antacid, the following morning, will generally be of service. It may be even requisite to repeat these; and afterwards, particularly when the urinary and fæcal excretions are disordered, to promote the actions of the liver and kidneys, by small doses of colchicum with magnesia or an alkaline subcarbonate. In the more painful cases of zona, these means will be found most beneficial. During the course of the complaint, the diet should be mild, chiefly farinaceous, and in small quantity. The beverages should be demulcent and cooling.

18. *B.* When herpes assumes a chronic character, owing to the successive eruption of clusters of vesicles, or to the excoriation of the inflamed skin, small doses of blue pill, or of the hydrargyrum cum creta, and mild stomachic aperients, are the most appropriate means. In addition to these, the decoction of sarsa, or of the elm-bark, with liquor potassæ, are often very serviceable. In *herpes labialis*, and *herpes præputialis*, these remedies are especially required. In more obstinate cases, particularly when the excretions continue disordered, mild stomachic purgatives, and alteratives, should be persisted in; and warm or tepid bathing, or even vapour baths, occasionally employed. In *herpes iris*, the warm bath, and minute doses of the arsenical solution with the liquor posassæ, are generally of service. Dr. A. T. Thomson, recommends, for this species, the decoction of the Rumex obtusifolius with these alteratives.

19. *C.* When herpes occurs in cachectic or aged persons, not only should great attention be paid to the state of the excretions, all fæcal and morbid accumulations being duly evacuated; but the digestive and assimilating functions ought to be promoted, by exhibiting gentle tonics, with the alkaline carbonates. If the eruption ulcerate, the application of nitrate of silver, in substance, or in a strong solution, will promote cicatrisation. If there appear a disposition to slough, the preparations of bark, &c. will be required. When violent sub-cutaneous pains accompany zona, hyoscyamus or other narcotics may be given with the medicines already recommended; but the warm or vapour bath, and colchicum, as above prescribed (§ 17.), will be found the most successful. In *herpes præputialis* and *herpes vulvæ*, the early application of nitrate of silver will often shorten the duration of the eruption. Where there are much heat and stinging of the parts, a wash containing the subborate of soda, or the

sulphate of zinc, or of alumina, will often be useful. These may also be prescribed in herpes circinnatus; but in all cases the chief attention must be directed to the removal of disorder in the digestive and biliary organs, and to the regimen of the patient.

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HICCUP.— SYN. Λὺγξ, λυγυὸς, Hippocrates. *Singultus*, Pliny, Sauvages, Vogel, Sagar. *Lygmus*, Swediaur. *Pneusis singultus*, Young. *Clonus singultus*, Good. *Hoquet*, Fr. *Glucksen*, *Schlucken*, Germ. *Singhiozzo*, Ital. *Hiccough*, *hocket*, *hickup*.

CLASSIF. — 4. *Class*, 3. *Order* (*Good*). II. CLASS, III. ORDER (*Author*).

1. DEFIN.— *An uneasy sensation at the præcordia followed by a rapid contraction of the diaphragm, of momentary duration, causing an audible inspiration, iterated at short intervals.*

2. i. *Description*. Although hiccup is frequently symptomatic of dangerous maladies, and is even a fatal sign in these, yet it is occasionally the chief and primary disorder. When it is thus idiopathic it is generally a slight and evanescent affection. It consists of a sudden and rapid contraction of the respiratory muscles, of the diaphragm especially, instantly followed by relaxation, thereby causing as rapid an inspiration, which is audible from its suddenness and force. These convulsive movements return at short intervals, and are attended by painful uneasiness at the præcordia and epigastrium, increasing with the frequency of the convulsive contractions and continuance of the disease.

3. ii. *Causes.*— Hiccup occurs frequently in infants and young children. It is not uncommon in aged persons: and, at these epochs, is generally symptomatic of irritation of the stomach or duodenum, or produced by a too precipitate deglutition, the movements which accomplish this process often taking place in an irritable or spastic manner, in persons at the two extremes of existence. The arrest of the alimentary bolus in the œsophagus; an insufficiently masticated or dry state of the bolus; an irregular or precipitate performance of deglutition, especially, when the stomach is empty or debilitated; the ingestion of highly seasoned or stimulating food or drink, or of cold fluids; laughter, particularly in hysterical females; long fasting and emptiness of the stomach; irritating or poisonous substances in this organ; worms in the digestive canal; and wearing strait-laced corsets, are the most common exciting causes of the less important and idiopathic cases of this affection.

4. Hiccup may be one of the forms in which hysteria manifests itself, particularly when hysterical patients have been subjected to mental emotions, as after crying or laughing. It may also follow a fit of cough or vomiting; or it may be produced by sudden frights. But in all these, debility, especially of the digestive organs, is a predisposing cause. It is often a symptom of irritation or inflammation of an adjoining viscus, particularly of the convex surface of the liver, and of the stomach, especially at its cardiac orifice. It may arise from the passage of biliary calculi along the ducts, or from calculi in the kidneys or in their passage into the ureters. Strangulation of internal parts, irritating matters in the colon, external injuries and fractures of the ribs, the various stages of pregnancy, and the suppression of accustomed discharges and eruptions, have severally produced it. Besides, singultus occurs in a great number of acute diseases and fevers, particularly towards the close of life. It usually attends fatal cases of inflammation of the abdominal viscera, and is generally present when hepatitis of the upper or posterior parts of the liver extends to the diaphragmatic peritoneum, or when abscess of this organ points upon the diaphragm.

5. When singultus occurs after a too full meal, or after the ingestion of cold or irritating fluids, which is very common, it is comparatively of little import, further than that it evinces a debilitated state of the stomach and increased irritability. But when it follows a meal either frequently or habitually, chronic inflammation of the stomach, especially about the cardiac orifice, or even of the œsophagus or duodenum, should be suspected; or irritation of the pancreas or biliary ducts, or worms in the alimentary canal may exist. When depending upon this latter cause, it sometimes alternates with sneezing and pruritus of the nostrils.

6. Authors have recorded numerous instances of hiccup continuing from two to three days to many months, or even longer, in some cases without any other very prominent symptom of disease; in others, alternating with sneezing, syncope, or hysteria. Various anomalous cases of this affection have been recorded by POTERIUS, SCHENCK,

Bartholin, Alberti, Lanzoni, Hoffmann, Bauer, Parr, and others. Most of these have arisen from some permanent source of irritation, as biliary or urinary calculi; or have been one of the many manifestations of hysteria. The only instances of persistent hiccup that I have observed, were referable to these sources, or to uterine irritation.

7. iii. The *lesions of structure* most frequently observed in those who have experienced this affection in a remarkable manner, have been chiefly the following: — The usual appearances and results of inflammation of the peritoneum pleura, diaphragm, liver, stomach, or other adjoining viscera; encysted or other tumours connected with, or pressing upon, the diaphragm or its crura; scirrhus of the cardiac orifice of the stomach, or of the pancreas; morbid structures developed about the root of the mesentery; calculi, and abscesses in the kidneys, or calculi in the gall ducts; tumours pressing upon the eighth pair of nerves; and albuminous or other fluids effused into the sacs of the pleura, or into the peritoneum.

8. iv. Of the *diagnosis and prognosis* of singultus it is unnecessary to make any specific mention. The former is obvious: the latter may be inferred from what has been already stated. When hiccup is the primary disorder, and quite independent of internal inflammations, or of fever, a favourable result will generally follow, although it may be more than usually severe or frequent in its attacks. But when it is a symptom of these maladies, and appears at a far-advanced stage of acute or chronic diseases, it is generally a fatal indication. Cases, however, will occur in which the experience and pathological discrimination of the practitioner will be severely tried in giving an opinion as to the result.

9. v. *Treatment.* The means of cure in this complaint should be selected with strict reference to the causes and pathological dependency of it. — *A.* In the *primary* or *idiopathic* forms of it, the administration of *opium* with *ether*, or of other *anodynes* and diffusible *stimulants*, and of refreshing alkaline beverages, will generally give relief. Various *antispasmodics*, volatile nervines, and sedatives, especially *camphor*, *ammonia*, *hyoscyamus*, *hydrocyanic acid*, either taken into the stomach, or inhaled into the lungs with warm vapour, will often remove the complaint. Idopathic hiccup also may cease spontaneously; or it may be arrested by exciting some powerful mental emotion, as surprize, fright, &c., or by powerfully exciting the diaphragm by *sternutatories* or *emetics;* or by taking any substance in quantity into the stomach. When its continuance or severity requires medical interference, the pathological knowledge and diagnostic acumen of the physician are often put to the test, as either the absence of other symptoms, or their equivocal nature, renders it doubtful to what cause it should be assigned. In those cases, the chest and abdomen ought to be minutely examined before any opinion is formed.

10. In obscure or doubtful cases, *camphor*, with or without the *nitrate of potash;* the *spiritus ætheris nitrici*, or the *spiritus ætheris sulphurici comp.*, or the *tinctura camphoræ composita* may be given with *demulcents.* The alkaline *sub-carbonates* may also be exhibited with *hyoscyamus*, or with *colchicum*, *opium;* or the *hydrocyanic acid* may be given in an aromatic or gently tonic infusion. If there be reason to refer the affection to irritation in the kidneys, or in the biliary ducts, demulcents with camphor, and the *sub-carbonates of soda, &c.*, will generally be of service. If it appear to depend upon worms, the treatment should be directed accordingly. When it is referrible to inflammatory action in the stomach, or duodenum, full doses of *calomel* with opium and small quantities of camphor, general or local depletions according to circumstances, and cathartic enemata, are chiefly to be depended upon. Even in the more obscure, and non-febrile cases, which may resist soothing and antispasmodic remedies, *cupping* over the hypochondria, or along the vertebral column, as recommended by J. P. Frank, followed by *blisters*, *sinapisms*, *moxas*, the warm *turpentine epithem*, or other counter-irritants, in the same situation, may be prescribed. In cases where vascular depletion seems inadmissible, advantage may be derived from *dry-cupping*, as advised by Riedlin, Cleghorn, and Hufeland. Besides these, the tincture of *nux vomica* has been employed by Ranoë; and the *cajeput oil*, by Vogel.

11. When this affection is merely a form of *hysteria*, or is connected with uterine irritation, *cold aspersions* of the surface; *refrigerants* with camphor, and the other means usually employed in that complaint are indicated. When it assumes a periodic character the *sulphate of quinine*, and other preparations of bark may be prescribed, with sulphuric acid, and sulphuric æther. Repeated doses of *magnesia* with *ammonia* and *aromatics;* the carbonates of *iron*, and other preparations of this metal; the sub-nitrate of *bismuth;* the various preparations of *zinc;* and lastly, *electricity* or galvanism in the direction of the spine or diaphragm, have severally been recommended.

12. When hiccup is a distressing symptom about the fatal termination of disease, large doses of camphor, of ammonia, or of musk, and opiate frictions, &c., have generally been prescribed; but these can only palliate, and very frequently they are inadequate to accomplish this intention.

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HOOPING-COUGH. — Synon. *Pertussis*, Sydenham, Huxham, Cullen, Darwin. *Tussis Ferina*, Hoffmann. *Tussis Convulsiva*, Sauvages. *Tussis Quinta*, Schenck. *Tussis Clangosa*, Bourdelin. *Tussis Delassans*, *T. suffocans*, *T. Amphimerina*, *T. Tussiculosa*, *T. Stomachalis*, *T. Spasmodica*, Auct. var. *Pneusis Pertussis*, Young. *Bex convulsiva*, Good. *Bronchitis Epidemica*, Marcus. *Bronchitis Convulsiva*, Prunel. *Bronchocephalitis*, Desruelles. *Coqueluche*, *Maladie Cuculaire*, *Toux Quinteuse*, Fr. *Keichhusten*, *Kikhusten*, *Krampfhusten*, Germ. *Kikhosta*, Swed. *Pertosse*, Ital. *Whooping-cough*, *Chin-cough*, *Kin-cough*, *Kinkhost.*

CLASSIF. — 2. *Class.* 3. *Order* (Cullen). 2. *Class* 2. Order (*Good*). II. CLASS, III. ORDER (*Author*, in *Preface*).

1. DEFIN. — *Convulsive and suffocative cough, accompanied with a reiterated hoop, or consisting of many successive short expirations followed by one deep and loud inspiration, and these, alternating for several times; occurring in paroxysms, ending with the expectoration of tough phlegm, and frequently with vomiting; infectious and often epidemic; appearing but once during life.*

2. M. GUERSENT defines hooping-cough to be a catarrhal affection of the air-passages, characterised by sonorous inspirations with imminent suffocation. The origin of this disease is obscure; for, if the ancients have at all observed it, they have not described it so as to enable us to recognise it. Doubtless new maladies may develop themselves in the progress of the refinements of society, and of the changes which the physical and moral world have undergone during a lapse of ages. This cannot be denied in respect of some of the exanthemata, or of diseases propagated by a specific virus, as smallpox. But, excepting these, it is difficult to admit, that those maladies the spread of which very much depends upon atmospheric vicissitudes, and epidemic constitutions, and upon general susceptibility of the species, can have been of modern occurrence entirely. It is not easy to conceive why a disease should not have at least occasionally appeared; since the circumstances favouring, and causes inducing, it must have been in existence from the earliest ages. It may be said of hooping-cough, as of some other diseases, that, although the more exact observations and descriptions of modern observers have made it known only in comparatively recent periods, yet it may have existed nevertheless, and have been unknown from having been confounded with other maladies resembling it.

3. The passages in HIPPOCRATES that may be referred to this disease, are equally applicable to several other catarrhal affections, or disorders of the respiratory organs. Some of the older writers take notice of epidemics, which have been considered to have been hooping-cough, especially those of 1239 and 1311. But they may have been severe catarrhal epidemics, or influenza. ROSEN thinks, that pertussis passed from the East Indies and Africa into Europe; but of this he has furnished no satisfactory proof. According to MEZERAY, it first appeared in France in 1414; and he has been generally considered as having given the earliest account or description of the disease. But, upon referring to this writer (*Abrégé Chron. ou Extrait de l'Hist. de France*, t. iv. p. 65.) there is nothing but the name *Coqueluche* that is applicable to it. Indeed his account would have been quite applicable to the influenza of January, 1837. The epidemics noticed by DE THOU, and PASQUIER, to which the same name was given, and which occurred in 1510, and 1557, were evidently influenza, and not hooping-cough; and the same remark is applicable to most of the supposed epidemics of this latter disease, during the sixteenth and seventeenth centuries.

4. WILLIS was the first who accurately described hooping-cough under the name of "Tussis puerorum convulsiva, seu suffocativa, et nostro idiomate *chincough* vulgo dicta." (*Opera omnia*, Amst. 1682. vol. ii. p. 169.), and it is only from his time that we have any account of the disease that can be relied upon. It was afterwards noticed by SYDENHAM, (*Op.Universa*. Lugd. Bat. 1726. p. 311.), and by both it was treated of as a common disease. It is extremely doubtful that the epidemics of the 15th and 16th centuries, which proved so very fatal were actually this complaint. The imperfect notices made of them convey nothing really proving that they were it. ROSEN confesses, that he cannot determine when pertussis first appeared in Sweden; and, as respects this country, there is no account earlier than that of WILLIS which can be received.

5. I. DESCRIPTION. — Hooping-cough, whether in an epidemic or sporadic form, presents nearly the same phenomena, particularly when it is simple or uncomplicated. But it is modified in many respects by the season, climate, constitution or habit of body of the patient, and by the complications which take place in its early stages. I shall, therefore, describe, first, its simple or uncomplicated form, and, secondly, the complications which it frequently presents.

6. i. SIMPLE HOOPING-COUGH. — Pertussis has been divided into two stages by some writers, viz., the *catarrhal* and the *convulsive;* and into three by others, the second stage being divided by the latter into the periods of convulsion, and of decline. *A.* The *stage of development*, or the catarrhal period, is generally announced by some slight rigors or chills, turgescence of the face, slight redness of the conjunctiva, watering of the eyes, and the signs of simple coryza. There is scarcely any fever, sometimes only, for twenty-four or thirty-six hours; but, in some cases, the fever is more marked, and it occasionally assumes a quotidian or tertian type. The cough is more or less frequent, comes on in fits, and may at this time be taken for common catarrh, or catarrhal affection of the trachea and bronchi. However, a slight shade of difference may be detected in the tone of the voice, which experienced observers will recognise as characteristic of the disease. The cough is more sonorous, and more acute than in bronchitis; expectoration is scanty, even with adults, and the matter brought up is limpid, as at the commencement of catarrhal affections. The anterior part of the neck is sometimes uneasy, or even painful, but in other respects there is little complaint, excepting a slight depression of spirits, moroseness, heaviness, diminished appetite, and sluggish bowels. This period generally continues from five to twelve days, and seldom more than fifteen.

7. *B. In the Convulsive, Spasmodic, or Nervous Stage*, the patients complain frequently of uneasiness or pain under the sternum; the fits of cough are longer, more frequent, particularly at night, and commence with unpleasant titilation at the larynx, during which the expiratory and inspiratory movements are irregular and incomplete, chiefly in very young children, who evince considerable dread of the attack. This state is attended with anxiety and a slight mucous rattle. On the accession of the fit, infants grasp persons or objects that are near them, or upon awakening from sleep start up. Each accession consists of a very dry, sonorous, spasmodic cough; the contractions of the respiratory muscles, being so quick, and succeeding each other so rapidly,

and attended with so much constriction of the larynx, that the patient cannot breathe and seems almost suffocated. The face and neck are swollen, injected, and violet-coloured; the jugular veins are gorged; the eyes prominent, injected, and watering; and the paroxysm terminates with one or two long incomplete inspirations, attended with that peculiar noise from which the disease has generally derived its designation. Sometimes the fit of cough is interrupted during one or several minutes, and is resumed; but does not cease entirely until the patient rejects, by a sort of regurgitation, a ropy and limpid fluid, which comes partly from the bronchi, and partly from the stomach, as shown by the presence of portions of ingesta, and of bronchial mucus. In some cases, when vomiting does not accompany the paroxysm, this particular fluid proceeds chiefly from the air-passages; in others, particularly in those accompanied with vomiting, it is chiefly from the stomach. It is sometimes sanguineous, either in streaks or specks; and when the paroxyms are severe, blood sometimes escapes from the nostrils, and even, in rare cases, from the ears and eyelids. The termination of the paroxysms is often attended by a watery secretion from the eyes. Crying, mental irritation, or opposition, frequently bring on a fit; and even the sight of another in the paroxysm, will induce it in those affected by the disease. The fits are generally much more severe after a meal, or after running, or other very active exercise. Their number varies with the severity of the disease, from five or six in the twenty-four hours, to one every ten or fifteen minutes; they are generally severer, and more frequent during the night than in the day. On applying the stethoscope or the ear to the chest, on the accession of the paroxysms, a mucous rattle may sometimes be heard; but frequently no unnatural noise can be detected, unless the disease is complicated with bronchitis. During the paroxysm the respiration is so far suspended as not to be heard in any part of the lungs; but at the moment of inspiration, the air is precipitated by a loud hissing sound, as far as the bifurcation of the bronchi, where it seems to encounter some obstacle, as it does not pass further for one or two seconds. This stage usually continues from fifteen days to a month, or even longer. During its course, the fever, which had been either scarcely perceptible or but slight, but had been suspended after the invasion of the disease, is, in some cases, rekindled with more force, assuming the continued or intermitting type. It is chiefly during the early part of this stage that pertussis becomes complicated with, or excites, bronchitis or other disease of the lungs. Yet such complications occur at various intervals from the attack, and sometimes even accompany the first stage. But it is generally during this period that affections of the head, or of the abdominal viscera, supervene, which, with lesions of the lungs, occasion unfavourable terminations. However, when the disease is slight and uncomplicated, it is without fever, the patients preserving their usual health and appetite, which may be even more craving than usual.

8. C. The *Stage of Decline* is of indeterminate duration, occurring from three to five weeks after the invasion of the disease, and continuing from twelve days to two or three months. It may be said to commence from the time of the paroxysms being more distant and shorter than in the preceding period, and by their termination, in the excretion of an opaque and thickish matter, as in the last stages of catarrh, and in the vomiting of alimentary matters. The fits become insensibly feebler during this stage; the cough gradually loses the characteristic whoop, and approximates nearer that attending the last stages of catarrhal affections. Sometimes the patient will remain for a day or two, or even longer, without cough; but on exposure to cold, change of temperature or weather, or after errors of diet, it returns with similar characters. In some seasons especially, as during autumn, and at other seasons on the occurrence of easterly winds, I have seen the paroxysms of cough return, with the same characters after a fortnight, a month, or even two or three months, of perfect and apparent recovery.

9. ii. COMPLICATED PERTUSSIS.—Hooping-cough is frequently accompanied with, or occasions, in its severer forms, or in predisposed subjects, most serious affections. It may even attack patients already suffering or convalescent from disease; and although occurring under such unfavourable circumstances, may not be severe and may terminate favourably, although in other cases it will often aggravate the pre-existing or accompanying malady — so much so as even to lead to a fatal termination. The complications of hooping-cough vary extremely, according to the season of the year, the state of the weather and atmospherical vicissitudes, the character of the prevailing epidemic, and the habit and temperament of the patient. They constitute the most important features of the disease, inasmuch as the danger depends entirely upon the particular form of complication present. The success, also, of the practitioner will mainly depend on the celerity and accuracy with which he may detect existing or incipient states of superadded or contingent disease, and the decision with which he may treat them. The importance of attending closely to the progress of whooping-cough, even in apparently favourable cases, must be apparent to those who have had occasion to observe how insidiously diseases of the substance of the lungs, or of the brain, have supervened and advanced even to an irremediable degree, masked by the cough, so as to have failed of attracting the attention of parents or those around the patient — or, if they have attracted notice, to have been mistaken for a symptom merely of the simple and less dangerous affection. I have frequently been called to children dangerously affected with disease of the lungs or brain, which had been in existence for many days before attention had been excited by it. Considering the complications of pertussis most important, I shall treat of them somewhat in detail.

10. Pertussis, in either an epidemic or sporadic form, particularly the former, sometimes follows rapidly upon measles. Occasionally it appears during convalescence from that complaint. In such cases disease of the lungs, particularly bronchitis, pneumonia, pleurisy, tubercles, &c., often steals on without being suspected until it has made a formidable progress, or passed beyond the reach of aid. The previous disease, and the treatment employed for it, has often induced that state of the system which does not evince the complication by many of the usual symptoms which characterise it, in the idiopathic or primary form; and it is chiefly by attentive observation of

the pulse and respiration, in the intervals between the paroxysms, and of the expectorated matter, and by examining the state of the lungs by means of percussion and the stethoscope, that we can detect the complication or judge of its nature and extent. In infants with a narrow, or malformed chest, there are often great dyspnœa, frequency of pulse and of respiration, sometimes even without much serious disease of the lungs, beyond slight bronchial irritation. The most common complications of hooping-cough, especially from two or three months old to seven or eight years or later, are *croup*, *bronchitis*, *pneumonia*, *pleurisy*, *pneumothorax*, *œdema of the lungs*, *hydro-thorax*. In all these the respiration is difficult, frequent, and embarrassed; the countenance and extremities are turgid; and there is continued frequency of pulse. The expectoration terminating the paroxysms, varies according as either of the above lesions is present. It is generally much diminished, and, in proportion to the severity of the organic disease and of the accompanying fever. But the extent and nature of the complication should be carefully determined by the stethoscope and by percussion. In somewhat older children, and in those advancing nearer to puberty, who are of a scrofulous habit, and hereditarily disposed to phthisis, hæmoptysis, sometimes to a considerable extent, takes place, and in these subjects particularly, tubercular disease of the lungs is not infrequently developed, either with or without hæmoptoe.

11. *B.* In infants and young children, the *functions of the brain*, and the symptoms, indicating disturbance of this organ, should be carefully watched for, particularly those indicating *cerebral congestion*, *hydrocephalus*, *meningitis*, or *cerebritis*; and if any of these symptoms occur, and especially if attended by continued fever, by screaming, or by rolling of the head, or convulsions indicating meningitis, or hydrocephalus; or by somnolency, falling of the eyelids, cool state of skin, inability or disinclination to move or be moved, with dilated pupil, &c. indicating cerebritis, decisive treatment should be adopted, as recommended for these maladies.

12. *C. Diseases of the Abdominal Viscera* are much more rarely complicated with hooping-cough than those already mentioned; however *diarrhœa*, chronic *irritation of the stomach and bowels*, *remittent fever*, *inflammation of the mucous surface* of these organs, are not infrequent attendants upon it. Sometimes, even, *inflammation of the peritoneum* and *mesentery* will occur, during the advanced stages of hooping-cough, and I have occasionally also met with inflammation of the cæcum and colon, and *pericarditis*. These complications, particularly those of the digestive mucous surface, may superinduce others, as enlargement of the mesenteric glands, and affections of the cerebral organs, rapidly terminating in effusion.

13. With respect to all these complications, it may be generally remarked, that they are attended by more or less fever of a continued or remittent type, and with paroxysms of cough, more or less dry and severe. Sometimes the febrile exacerbations and remissions are well marked, especially when the complication is in the abdominal cavity. The expectoration terminating the fits generally diminishes as the complication increases in severity, and the vomitings often disappear. The paroxysms also are followed by more sensible prostration of strength. — Having thus taken a general view of complicated pertussis, I shall next more particularly notice those complications which most commonly occur, and which frequently superinduce further disease especially in connected or associated structures.

14. *D. Pertussis associated with Bronchitis* is extremely frequent during spring and winter, and in this climate, especially in the months of February, March, and April, owing to the prevalence of easterly winds at that season. 1. It may precede hoopingcough; 2. It may be coeval with it; and, 3. It may supervene in the course of the disease. The last is most common. Whenever bronchitis appears, there are always decidedly febrile symptoms during the intervals between the paroxysms of cough. The breathing is also much accelerated, and when examined by auscultation is accompanied by the mucous rattle, and occasional temporary suspension of the respiratory sound in parts of the lungs, owing to the accumulation of the mucous secretion for a while in one or more of the bronchial tubes conveying air to those parts of the organ. The expectoration also from being clear, whitish, and ropy, becomes more opaque, less fluid, gelatinous, and less abundant. The paroxysms of cough are much more frequent, and often accompanied with a feeling of oppression in the chest, and are less constantly followed, or even not at all, by rejection of the contents of the stomach. The chest sounds well upon percussion, and the patient lies on the side most affected, or in slighter cases on either side. When the bronchi of both lungs are generally affected, he is unable to lie on either side, or is incapable of lying down at all.

15. This complication often terminates fatally, either from obstruction of the air-tubes by the accumulation of tenacious mucus, together with spasm about the larynx, occasioned by the nervous character of the disease, and the irritation of the glutinous secretion, the patient dying asphyxied; or from congestion of the vessels of the head, owing to the paroxysms of cough, the obstruction produced by the mucus in the air-passages, and the difficult circulation through the lungs; or from the inflammatory action having extended to the trachea and larynx, or to the minute bronchi and substance of the lungs, terminating in condensation. &c. of the structure of the organ, &c. In some cases, owing to the treatment employed and constitution of the patient, the acute form of the bronchial affection gradually subsides until it arrives at a milder state; when, owing to the incapability of the vessels to assume the healthy state, a chronic form of disease continues long afterwards, which may be removed, in some cases, by judicious management; but which terminates in ulceration of the mucous membrane, or gives rise to tubercles, to chronic pleuritis, or other lesions in the thoracic cavity. This complication is frequent from six or seven months upwards, and especially during the second, third, and fourth years of age.

16. *E. Hooping-cough associated with pneumonia and pleuritis*, is very frequent in the spring during easterly or northerly winds, particularly when these follow heavy falls of rain and open weather. It is more common in some epidemics than in others, and is met with at all ages, but most frequently from one to six or seven years or upwards;

and in children of a full habit of body, sanguine temperament, and strumous diathesis, it may be nearly coeval with the pertussis; but it more commonly supervenes in the course of the disease, the inflammation commencing often as bronchitis and extending in parts along the smaller ramifications of the bronchi, to the air-cells and substance of the lungs. In some cases, *pleuritis* supervenes to the pneumonia, and in others a portion or a whole lobe of the organ, and the pleura covering it, seem as simultaneously affected. It is very difficult to ascertain the existence of this complication in infants and very young children, but auscultation and percussion furnish considerable aid to the diagnosis.

17. The *Symptoms* of this complication vary according as the inflammation of the lungs and hoopingcough are coeval affections, or as the one may supervene to the other. When the affection of the lungs or pleura is present from the commencement, the cough occurs frequently, in short paroxysms, and is seldom followed by the rejection of the contents of the stomach. The pulse and respiration are quick, hard, full, and hurried; the alæ nasi and diaphragm labour much during the respiratory motions, and the cough is without the attendant hoop, and does not terminate in vomiting, as the complication becomes developed. When it has been consequent upon the bronchial complication, wheezing, and difficult expectoration are generally present; and the sputa become thick, opaque, glutinous, puriform, or streaked with blood. The prostration of strength is also great. There is a dull sound given out upon percussion of the thorax, over the seat of the disease. On examining the chest with the stethoscope, the signs enumerated in the pneumonia of children are more or less manifest (see art. LUNGS—*Inflammation of*).—When the *pleura* is implicated the cough is more suppressed, and pain is complained of in some part or other of the thorax; yet this latter symptom is not always prominent. In addition to the other stethoscopic signs, the metallic trickling is often present. In the worst cases of this complication, as in those of the preceding, the lips assume a livid hue, and the extremities become cold, or even of a leaden colour. This complication often terminates unfavourably in a short time. During its continuance, the hooping-cough presents characters much less distinct, but which become more pronounced as the inflammation is subdued.

18. *F. Complications with tubercular Phythisis, hydro-thorax,* or *pneumo-thorax,* are rarely or never met with, unless as the consequences of one or other of the foregoing, or in the far-advanced stages of pertussis; and are, therefore, unfavourable terminations, rather than complications, of the disease, arising out of neglect or inappropriate treatment, or constitutional predisposition. The state of the expectoration and hectic symptoms, and the signs furnished by auscultation and percussion, will enable the practitioner to detect either of these terminations.

19. *G. Pertussis associated with inflammatory irritation of the Membranes or Substance of the brain, or occasioning Hydrocephalus,* is very common, particularly in infants, about the period of dentition, or from six months to two or three years of age. In these, convulsions in various forms, spasm of the glottis, screaming, &c., are of frequent occurrence, and indicative of this complication, which is often more prevalent in some epidemics than in others. Congestion of the brain, owing to interruptions to the return of blood from it, during the paroxysms of this disease, often terminates in effusion, capillary reaction, or even softening of parts of the organ. The spasms and convulsions which generally attend these affections of the brain in infants and young children, rarely carry off the patient. They are rather the indications of that state of disease of the substance or membranes of the brain, which terminates in softening of the central parts, and in serous effusion into the ventricles. Whenever the paroxysm of cough is increased in violence, the characteristic hoop disappearing, the face becoming very livid, and the thumbs drawn into the palms, cerebral congestion, with its attendants and consequences, should be anticipated. In some cases, but by no means frequently, the swelling on the tops of the fingers and toes, noticed by Dr. KELLIE, and the crowing inspirations indicating spasm of the larynx (see LARYNX) and threatening suffocation, are observed, generally at early stages of this complication. When the convulsions affect one side of the body more than the other, and especially if one side or limb be paralysed, softening of some of the more central parts of the brain and serous effusion may be inferred.

20. In all cases of pertussis, when chills, followed by burning heat of the surface; pains of the head, with obscure redness of the conjunctiva; a fixed, brilliant, dry, and peculiar appearance of the eye; unusual redness or pallor of the face; very torpid bowels with morbid excretions; irritability of stomach independently of the fits of cough; aversion from light or noise; heaviness or drowsiness and languor; grinding of the teeth; or sudden starting or shocks of the body in sleep; rolling or tossing back the head, and piercing screams; are observed, then irritation of the brain or its membranes, which will soon pass into organic change and effusion, is manifestly present, whether there be convulsions or not. When stupor or unconsciousness has come on, with one arm waving in the air, or tossed over the head, whilst the other is paralysed, a farther advanced state of disease than mere inflammatory irritation, as softening or effusion, may be inferred.

21. *H. Pertussis associated with Disorder of the Bowels, or with infantile remittent Fever,* is not infrequently observed. In these cases the abdomen is tumid, the evacuations offensive and unnatural, the breath is fœtid, the tongue loaded, and the appetite is impaired. The complexion is lost, and the eyes more sunk and heavy than in health. At last febrile exacerbations and remissions are observed generally twice in the twenty-four hours; pickings of the nostrils and lips; the cough returns more frequently and ceases to terminate in vomiting; the breathing is oppressed, hurried, and short; the expectoration, at the termination of the fits, is more scanty, but without the signs of bronchitis or of pneumonia; and emaciation proceeds. If this state of disorder continue, effusion in the ventricles of the brain may take place, or the mesenteric glands may become diseased. This complication steals on imperceptibly, and generally in the second or third stage of pertussis.

22. iii. *The Appearances observed in fatal Cases of Pertussis* show the nature and extent of the complications, rather than of the disease itself. The accounts furnished us of the fatal epidemics in former ages, contain no details of the appearances after death; and even the more recent researches of WATT, MARCUS, WATERTON, GUIBERT, DESRUELLES, GUERSENT, and others have thrown little light upon the nature of the malady, although they have illustrated the changes which often supervene in its course. The lesions which are most constantly observed, are more or less redness of the mucous surface of the trachea and bronchi, with considerable tumefaction of the glands at the bifurcation of the latter. These tubes contain a considerable quantity of a ropy or more or less thick mucus. In the bronchitic complication these changes are still more marked, and in infants the thymus gland is often unusually large. Inflammations of the lungs, or of the pleura, or of both, in all their phases and stages; and effusions into the pleural cavities, with or without adhesions or false membranes, are not unusual, but are observed only in cases of the pulmonary complications described above. They are generally associated with muco-puriform matter accumulated in the bronchi, and splenification or condensation of several lobules or portions of the lungs.

23. When the disease induces chronic bronchitis or tubercular consumption, whether hæmoptœ has occurred or not, the mucous membrane of the bronchi has been found thickened, softened, rarely ulcerated in some points and injected, and tubercles have been observed in all stages of development and softening, and accompanied with ulcerated excavations. Tubercular changes are, however, not very common in young children. Dilatation of the bronchi is sometimes observed; but I have not met with it so often as LAENNEC believes it to occur. It is to be looked upon as a remote consequence of the disease in prolonged cases. M. BRESCHET observed, in two instances, injection of the pneumo-gastric nerves: but MARCUS, GUERSENT, and myself have not found these nerves materially changed.

24. The morbid appearances found within the cranium have been chiefly consequent upon the cerebral complications, and have consisted of softening of the central parts of the cerebrum; effusion into the ventricles, or between and beneath the membranes; congestion of the vessels, &c. As far as my dissections have gone, inflammatory appearances have been observed in the medulla oblongata, or in its membranes, even when no other remarkable lesion was present within the cranium. Whether this change be a consequence of the disease or not, is difficult to determine; but there can be little doubt that those found in the brain are merely remotely consecutive lesions.

25. The stomach usually presents no particular lesion; but I have observed inflammatory appearances in the œsophagus, and the same have been remarked by OZANAM in his numerous dissections in the Foundling Hospital at Milan. I have likewise found the mucous surface of the pharynx and epiglottis, particularly the latter, more or less inflamed, and the subjacent cellular tissue, especially at the base of the epiglottis, infiltrated and œdematous. The mucous membrane of the intestines, particularly of the cæcum and colon, has been in some instances ulcerated, and the mesenteric glands engorged; but only in protracted cases passing into infantile remittent fever. From the numerous post mortem examinations I have made, I am warranted in stating that most of the lesions observed by writers in this disease are merely effects of the complications of, and diseases excited by, this complaint; and that the parts most constantly found altered, are the mucous covering of the epiglottis, trachea, and bronchi; and of the pharynx and œsophagus; and, as respects the nervous system, the medulla oblongata and its membranes.

26. iv. *Of the Nature and Seat of Pertussis.*— SYDENHAM imputed hooping-cough to the presence of a subtile and irritating vapour in the blood, affecting the lungs and exciting the paroxysms. BOEHME (*Cur-Methode der Wichtigsten, Brust krankeiten*, Leip. 1788), conceived that it proceeded from a peculiar miasma acting chiefly on the nerves. LINNÆUS had previously referred it to the presence of minute insects in the air (*Dissert. Exanthemata Viva.* Upsal, 1757); an opinion which was partially adopted by ROSENSTEIN, who, however, believed that it was propagated by a morbific principle emanating from the affected, and passing into the system of those exposed to its influence by the respiratory organs and stomach; and hence the affection of those viscera, and the irritation of the mucous glands, occasioning an inordinate secretion of *phlegm*.

27. WALDSCHMIDT (*Institut. Medicinæ Rationalis*, 12mo. Marb. 1688), STOLL (*Ratio Medendi*, pars ii. p. 180.) DANZ (*Versuch einer Allgemeinen Geschichte des Keichhustens, &c.* Marb. 1791), LENTIN (*Memorabilia*, p. 38), FRIBORG and BROUZET (*Sur l'Education des Enfans*, t. ii. p. 25), ascribed the disease chiefly to gastric disorder and saburra, whilst they admitted, particularly DANZ and LENTIN, that the lungs are also much affected, but in a sympathetic manner, and that the other symptomatic disorders accompanying it vary exceedingly, whilst the respiratory functions are more constantly disturbed. CHAMBON (*Des Maladies des Enfans*, t. ii. 8vo. Paris, 1799), and TOURTELLE (*Elémens de Méd. Théorique et Pratique*, t. ii.), considered pertussis as a species of catarrh. The former located it in the stomach, and supposed that it is of an asthenic nature, the cough and other nervous symptoms being occasioned by the affection of this organ. The latter extended the gastric disorder to the lungs, and regarded the disease as a pituitous pneumo-gastric affection. A similar opinion was entertained also by Dr. STYX (HUFELAND, *Journ. d. Pr. Arzneyk.* b. vii. st. iv. p. 177). GARDIEN (*Traité des Mal. des Enfans*, p. 391.) nearly coincided with TOURTELLE in referring it to a nervous irritation, *sui generis*, causing a pituitous or increased mucous secretion from the bronchi and stomach with convulsive action of the glottis and diaphragm, and believed that it differs from catarrh chiefly in its cause and the periodicity of its character. The opinion of MILLOT was not materially different from the foregoing. He referred the disease to a spasmodic irritation of the stomach primarily, and of the lungs symptomatically, and he imputed the cough chiefly to the convulsive action of the diaphragm; but he contended that the throat and bronchi are also implicated. M. BROUSSAIS has also argued that the source of the disease is in the stomach; but he considers that it

consists of inflammatory irritation, producing an increased secretion of mucus, and that the termination of the fits in vomiting disembarrasses the affected surfaces and assuages for a time the irritation. He, however, admits that this affection of the stomach is not of itself sufficient to constitute the disease, but that it is always extended to the bronchi. (*Ann. de la Méd. Physiol. Mai*, 1824.)

28. Besides those who have thus considered pertussis either catarrhal in its nature, or allied to this state, others have conceived that it is chiefly of a nervous character. Whilst the former have placed the most stress upon the catarrhal symptoms, particularly the discharge of a clear ropy mucus, and the acceleration of the pulse in many cases,—the latter have been more engaged with the convulsive features of the disease, especially the cough, its occurrence in fits, as in other nervous affections; and with the perfect, or nearly perfect, state of the functions during the intervals in the simple form of the disease. — The opinions of HOFFMANN (*Opera.* Suppl. ii. pars x. p. 244.) and of HUFELAND (*Bemerk. ueber Blattern, &c.* p. 421.), in this very nearly coincide. They both impute hooping-cough to irritation of the nerves supplying the larynx, air-passages, diaphragm and stomach; to an affection chiefly of the pneumo-gastic nerves. HUFELAND supposes that the irritation of the nerves supplying the larynx and air-passages is extended to the diaphragm by the intimate sympathy existing between these parts; that this muscle is thereby thrown into convulsive action; and that, owing to its action on the cardia, and the irritation extending to the stomach through the medium of the eighth pair of nerves, this organ undergoes energetic contraction, and evacuates its contents; the vomiting thus occasioned removing the irritation of the respiratory organs, and thereby terminating the paroxysm. Thus, the vomiting is the antagonist of the spasmodic state of the organs of respiration; and, as observed in practice, a salutary occurrence. Very nearly allied to this opinion is that proposed by JAHN (*Ueber den Keichhusten.* Rudolstadt, 1808.) He considers hooping-cough to be an affection of the phrenic nerves, occasioned by a peculiar miasm too subtle to be recognised. LOBENSTEIN-LÖBEL (*Ueber die Ang. Membr. den Keichhusten, &c.* 1811.), contends, that this disease originates in a peculiar affection of the nerves of the diaphragm; that, in its second stage, the phrenic nerves are in a state of irritation; and that, in its third, the irritation is expanded throughout the system; it thus commencing with a morbid affection of the diaphragm, which extends itself by nervous connection to the rest of the respiratory apparatus and stomach, and sympathetically to the whole economy.

28.* According to PALDAME (*Der Stikhausten.* Halle, 1805.), hooping disease depends on exalted irritability of the lungs, and of the organs most closely sympathising with them, particularly the diaphragm and stomach. Nearly allied with the foregoing opinions, is that which has been proposed by WENDT (*Die Kinderkrankh. System. &c.* 8vo. Breslaw, 1822.). He arranges hooping-cough with nervous diseases; argues against the production of a secretion peculiar to it, yet imputes it to a certain miasm engendered by the nature of the season and constitution of the atmosphere, and thus prevailing generally in an epidemic form. The nerves which he considers chiefly affected, are the branches of the intercostals, the eighth pair, and the recurrent nerve; the solar plexus he views as being consecutively affected. He contends, that the disease is not a variety of bronchitis, as believed by many; and that the bronchi are only sympathetically irritated, and chiefly from the increased secretion of mucus and aqueous fluid poured into them during the paroxysm. He admits that it is generally accompanied with a phlogistic diathesis of the bronchi and substance of the lungs, but that there is no developed state of inflammation; this diathesis admitting, however, of inflammation being speedily kindled up from exposure to its exciting causes, and during certain epidemics; but when it exists, that it is merely a contingent complication.

29. M. GUIBERT (*Recherches Nouv. sur le Croup et sur la Coqueluche.* Paris, 1824.) views pertussis as essentially nervous. He considers that a common cough may pass into this affection, by having the spasmodic state of the muscles of the larynx and of the diaphragm superadded to it; and, therefore, that spasm superadded to cough constitutes the disease, — the state of spasm resulting from the high nervous susceptibility and particular disposition to it existing in children, and from individual idiosyncrasy. He supposes that, whilst the spasmodic state constituting the disease affects the muscles of the larynx and the diaphragm, in some cases this state is extended to the muscles of the head and whole body, occasioning general convulsions. The increased secretion of mucus he refers to an excited state of the mucous membrane of the air-passages, and of the pharynx, œsophagus, and stomach, existing independently of any inflammatory action; and considers that the paroxysms of cough proceed from obstruction of the bronchi by the accumulation of this secretion; the nervous symptoms being the result of the spasm, which he considers the chief agent of the morbid phenomena. But this theory leaves unexplained the precise cause and origin of the spasm, which, doubtless, affects the parts to which he refers it.

30. According to M. GUERSENT (*Dict. de Méd.* t. vi. p. 6.), hooping-cough is a catarrhal affection seated in the trachea and bronchi, consisting of a specific inflammation, accompanied with spasm of the trachea and glottis. To this opinion it may be objected, that the causes of the disease are not always of a specific character; that, although it evidently is often propagated by infection, yet it frequently occurs sporadically, and then it cannot be traced to any specific cause. When, also, inflammatory appearances are observed in the air-passages of some cases, which have terminated fatally, these differ not materially from the changes occasioned by common inflammation.

31. Dr. WATT (*Treatise on the History, Nature, and Treatment of Chincough.* Glasg. 1812.) considers the disease to be inflammatory, and seated in the bronchi. Dr. BADHAM, and MARCUS, of Bamberg, entertain the same view as Dr. WATT. ALBERS, of Bremen, denies hooping-cough to be essentially inflammatory. He justly states, that it is never so rapidly developed as bronchitis; that it is an affection of the nerves of the chest,

frequently occurring epidemically, and generally admitting of cure without the assistance of art, unless when appearing in a complicated state, or when inflammatory action supervenes in its progress, — a termination which would but seldom occur if it were essentially inflammatory, and which seldom is observed to follow bronchitis or pneumonia when left entirely to nature. Thus, whilst ALBERS considers hooping-cough to be an affection of the nerves of the thorax, with which bronchitis is frequently complicated, WATT and MARCUS conceive that it is a catarrhal bronchitis from its commencement. Nearly similar to the opinion of these two authors, seems to be that of M. FOURCADE-PRUNET, who views it as a variety of bronchitis, without, however, stating in what the difference consists. The convulsive paroxysms of cough he attributes to the morbid sensibility of the mucous membrane of the air-passages in their inflamed state, and to the irritation occasioned by the respired air and the secretion formed on this membrane. M. BOISSEAU (*Dict. abrégé des Scien. Médicales*, t. v.) entertains a similar opinion to that of M. FOURCADE-PRUNET; and Dr. DEWEES (*A Treatise on the Physical and Medical Management of Children*, 8vo. Phil. 1825.) contends that it is a catarrhal inflammation of the respiratory mucous membrane, with an augmented secretion of mucus. Dr. DAWSON (*Nosol. Pract. of Physic.* 8vo. Lond. 1824.) also believes in the inflammatory nature of the disease; but confines its primary seat to the mucous membrane of the glottis. LAENNEC regards it as a variety of pulmonary catarrh, holding an intermediate grade between the pituitous and the mucous catarrh; and he denominates it, from the convulsive character of the cough, convulsive catarrh. The expectoration he considers to be at the commencement pituitous, and towards its close nearly mucous. The absence of respiratory sounds during the paroxysms, he explains, by supposing either a momentary congestion from blood or serum, giving rise to a tumefaction of the mucous membrane sufficient to obstruct the bronchi, or to a spasmodic constriction of these tubes.

32. Dr. WEBSTER (*Med. and Phys. Journ.* Dec. 1822.) contends, that the symptoms, when closely viewed, warrant the conviction that hooping-cough depends upon inflammatory irritation of the brain, or of its membranes, or of both. A somewhat similar opinion had been given by A. LEROY (*Méd. Maternelle*, 8vo. Paris, 1803.), BOISSEAU, OTTO (*Nye Hygæa*, Aug. 1824.), and BEGIN (*Traité de Therapeutique, &c.* t. ii. 8vo. Paris, 1825.), have admitted the frequency of the association of cerebral affection with hooping-cough, even from the commencement; whilst they oppose the inference that the latter is dependent upon the former. Dr. WEBSTER is, however, the first writer who fully appreciated the influence of cerebral irritation on the respiratory organs in this disease, and excited attention to an important and early complication of it.

33. M. DESRUELLES states, that hooping-cough is an inflammation of the bronchi, giving rise, at an early period of its course, to cerebral irritation; that, as long as the bronchitis is simple, the cough is not attended by the characteristic hoop; but that, when the cerebral irritation commences, the diaphragm and muscles of the larynx, &c. become subject to convulsive actions, which impress the cough with its peculiar features. The arguments already adduced against the inflammatory origin of the disease, are equally applicable to this view; and the constant existence of cerebral irritation is by no means proved — the occasional supervention of this irritation being all that is fully ascertained.

34. From my researches into the pathology and treatment of hooping-cough, during some years previously to 1823, I was led to consider the medulla oblongata or its membranes very early implicated in this disease; evidences of inflammatory irritation of these parts having been very generally observed in the *post mortem* inspections I had made. I conceived that the morbid impression or irritation occasioned by the exciting cause in the upper parts of the respiratory surfaces, particularly the glottis and its vicinity, affects the respiratory nerves, especially the pneumagastric; and that the irritation is extended to the origins of these nerves, where it aggravates and perpetuates the primary affection. Where no predisposing, concurrent, or consecutive causes or influences favourable to the developement of inflammatory action either in the respiratory organs or in the brain exist, the morbid action does not proceed beyond an irritative state, and the disease preserves a simple form. But when such causes are in operation, the irritation passes into inflammatory action in either of these situations; in some cases extending from the epiglottis and pharynx to the bronchi and lungs, and in others from the medulla oblongata to the brain or its membranes. As the irritation increases or extends downwards along the respiratory surfaces on the one hand, or to the pharynx and gastric mucous surface on the other, and as it predominates in the one above the other, so does the disease assume more of a bronchitic or of a gastric character; the latter form being the most favourable, as tending to disembarrass the bronchi, and to prevent the extension of disease in that direction. When the disorder implicates the lungs, the gastric affection either does not appear, or is thereby superseded; and when the brain becomes affected, either the gastric symptoms are not observed, or they assume different characters, appearing in the intervals between the fits of cough, instead of terminating the fits, and the cough loses its convulsive or nervous form. It does not, however, follow that the stomach is materially affected, even when the vomiting is the most remarkable. In these cases, the irritation seldom extends much beyond the pharynx; the irritation of this part and of the epiglottis, and the convulsive nature of the cough, being the principal causes of the vomiting. The copious discharge of ropy mucus, terminating the fit, partly proceeds from the pharynx and vicinity, even when there is no vomiting. Attentive observation subsequently to the adoption of these views, and extensive experience of the treatment founded on them, have confirmed my confidence in their accuracy, in the principal points.

35. I believe that the disease is chiefly nervous, in the simple cases; that it preserves this character more or less throughout, even when inflammatory complications ensue; and that, in the uncomplicated state, the nervous affection never proceeds beyond irritation. The impression made by the causes, is followed by functional

lesion of the respiratory nerves, particularly the nervus vagus; and, owing to this lesion, the mucous surfaces they supply frequently experience consecutive changes, as respects the state of circulation, exhalation, and secretion. Hence result increased vascular determination and augmented secretion, attended by irritation of the glottis, epiglottis, pharynx, and air-tubes, inducing convulsive action; which supervenes the more readily, as the disease is essentially nervous in its nature, but often becoming, consecutively, irritative, or inflammatory; this last characteristic being only an occasional complication, occurring from predisposition, habit of body, epidemic influence, or fortuitous causes favourable to its developement. — The inflammatory appearances in the medulla oblongata and base of the brain may be owing to the functional relation of these parts to the respiratory order of nerves, which receive the first impression of disease, and whose functions are so manifestly disordered throughout, as noticed above (§ 7.); or these, as well as the consecutive cerebral complications, may be induced by the disposition to disordered circulation, occasioned by the change in the state of nervous influence, and perhaps still more by the impeded return of blood from the brain during the paroxysms.—The vomiting so generally terminating the fit has been, as I have shown, imputed by many primarily to the stomach. But this symptom is often attendant upon severe fits of cough, whenever the epiglottis suffers unusual irritation. As it does not occur during the first days of the complaint, it seems to be owing to irritation of this part, which has been gradually coming on with the progress of the disease, until it reaches a pitch occasioning increased convulsive action of the respiratory muscles, extending to the diaphragm, the abdominal muscles, and stomach; the irritation of the morbidly sensible epiglottis by the cough increasing the paroxysm, until vomiting is produced.

36. II. DIAGNOSIS. — The existence of this complaint, particularly at an early stage, is not always readily ascertained. During the first period, it is not easily distinguished from a common cold. In most instances, however, the more paroxysmal nature of the cough, and the absence of fever, will indicate the affection, although the characteristic hoop is wanting. Occasionally this sign is absent altogether, in the slightest cases, although the disease is prevalent in a family; and yet there may be little doubt of the nature of the cough. Its more or less convulsive form, the perfect intervals, the evidence of congestion towards the head during the fit, and, as the complaint advances, the copious discharge of ropy mucus, are quite distinctive, although there is no complete hoop. When this latter sign is present, or when the paroxysms of cough terminate in vomiting, there can be no doubt as to the disease.

37. III. PROGNOSIS. — When the complaint is simple, the prognosis is favourable. But it may, at first, assume this form, and afterwards become complicated, and consequently more or less dangerous, owing to injudicious management, to various influences, and to its continuance; therefore a cautious or reserved opinion should be given as to the result in all the early stages. The complaint is, generally speaking, more dangerous, the younger the child; but the period of dentition aggravates the risk. When, however, the infant has a healthy nurse, and is itself of a good constitution, — if it have not recently suffered from any infantile complaint, or been lately weaned — if the attack commences in summer or spring, or in a mild dry season — if the intervals be complete, and of considerable duration — and if the paroxysms be attended by vomiting and a free excretion of mucus,— a favourable prognosis may be entertained. If the lungs or the head — the latter especially — betray disorder, — if the child belong to consumptive, scrofulous, or old asthmatic parents — if there be tendency to cerebral diseases in the family, — a cautious or an unfavourable opinion should be given. All the symptoms indicative of the more serious complications (§ 10,11.), are signs of danger. Upon the whole, the complaint is more favourable in adults than in infants, or even than in children; yet there is great risk, even in them, of the occurrence of pneumonia, bronchitis, or pleuritis; and, in young adults, of a scrofulous diathesis, of phthisis, or of hæmoptysis. It may cause abortion in pregnant females; and, in those who are hysterical, the cough may ultimately pass into an obstinate form of that complaint, and be removed with difficulty, especially if the circumstance be overlooked. The occurrence of the complaint during convalescence from measles or scarlatina is unfavourable, inasmuch as bronchitis and the other pulmonary complications are apt to ensue. — The presence of cerebral symptoms, or of fever or a quick respiration in the intervals, and a scanty excretion of mucus after the fits, indicate danger.

38. IV. CAUSES, &c.—*Of the causes and modes of propagation of hooping-cough* we have no very positive knowledge. The disease occurs either epidemically or sporadically, and often during seasons, and under circumstances, wherein catarrhal and pulmonary affections prevail. When it commences in autumn or winter, it is always of longer duration than at other seasons; and, like other catarrhal complaints, it is often prevalent in spring and summer. It generally affects several or many at the same time; particularly infants from two or three weeks old and upwards, and children till after the second dentition. It sometimes occurs in adults, and but rarely in the aged. Among adults, females are oftener attacked than males; those of the latter who are nervous, irritable, or approach the nearest to the female constitution, being the most susceptible of it. It affects persons only once; but rare instances of second attacks have been observed.

39. Hooping-cough, independently of its epidemical appearance, seems to possess infectious properties, which, although admitted by the majority of authors, have been disputed by a few. It is always quickly propagated through a family, and its extension, when sporadic, may be prevented by removing the unaffected children. Mothers, nurses, and even fathers, who have not had the disease, will often contract it from their children; and I have known mothers, who had had it in their childhood, affected a second time by a child at the breast, or by its prevalence amongst the other children. Its infectious properties are further shown, by a child having caught it from others, at school or at nurse, and, when removed under the

disease to a distant part of the country, and into a family where it did not exist, communicating it readily to those who had not had it. Like all infectious maladies, it is much more rapidly propagated during certain constitutions of the air, particularly those in which catarrhal complaints are frequent, or when measles prevail, than in others. In its epidemic form, its infectious property appears to be most fully marked, from the circumstance, probably, of the concurring causes, whatever they are, being then more active, as well as from the predisposition these epidemic states occasion. Pertussis has also been frequently observed to follow, epidemically, upon epidemic morbilli. When it occurs sporadically, and during healthy states of the atmosphere, it often fails to be propagated, unless to those most predisposed. Moreover, it is often necessary to infection that the breath of the affected subject should be inspired by the unaffected; and that the disease should, at the time, be fully developed. The infectious property seems to diminish as the disease declines. Dr. Cullen and many others believed that it disappeared in from four to six weeks; but, as Dr. Elliotson remarks, the period cannot be fixed with any precision. It is generally from five to seven or nine days, or even longer, after exposure to infection, that the cough commences.

40. V. Treatment. — There are few maladies against which a greater array and variety of means, both medicinal and regimenal, have been recommended, than against hooping-cough. Vascular depletion, emetics, purgatives, diaphoretics, antispasmodics, excitants, internal and external irritants, &c., have been severally prescribed as unfailing agents, and combined, in infinite forms, in the treatment of this complaint. Although these may be extremely beneficial, they may be also most mischievous; success entirely depending upon their application appropriately to the peculiarities of individual cases. As the disease is variously modified and complicated, so it cannot be removed by a particular class of remedies, or by a specific form of treatment. Means inappropriately employed, may convert a simple and slight case into one both complicated and dangerous. — There are certain considerations requisite to a successful treatment of this complaint; and these should always be kept in view, not only in it, but also in all other epidemic maladies. I refer especially to the constitution and habit of body of the patient, to the character of the prevailing epidemic, to the nature of existing complications, and to the period and progress of the disease. It is owing to these circumstances, that the means which are beneficial in one case, or in one season, are often injurious in others. Thus the epidemics of spring or winter more frequently require vascular depletion, than those of summer and autumn, whilst these latter derive more benefit from emetics than the former. So important are the complications of pertussis, that the treatment should be mainly directed to their prevention or removal; and whatever they may be — whether bronchitis, pneumonia, congestion or inflammation of the brain, &c. — it should be recollected that they are much more dangerous, than when occurring primarily or in a state of previous health, unattended by the aggravating circumstances of this complaint.

41. i. *Treatment of Simple Hooping-cough.* — In the slighter cases, little more is required than attention to diet, regimen, and the excretions, unless the child be plethoric, when additional means will be necessary. — *a.* In the *first stage*, a dose of *rhubarb* with *hydrarg. cum creta* or *calomel*, and a little *ipecacuanha*, may be given every night, occasionally interposing an *emetic*. The *diet* should be farinaceous, with milk. The child ought to be confined to a mild, equable temperature, and wear flannel next the skin, in winter, spring, or autumn. If the patient be plethoric, it will be proper, as a precaution, to apply *leeches*, according to his age, either behind the ears or over the sternum, as the head, or respiratory organs, may indicate a disposition to be affected. In the more severe attacks, also, this measure should never be neglected; and *diaphoretics*, with small doses of *antimony*, or of *ipecacuanha*, ought to be given every four or five hours; the secretions and excretions being duly promoted by calomel and rhubarb every night, and a stomachic *purgative*, or an emetic, each second or third morning, according to circumstances.

42. *b.* In the *second stage* of simple pertussis, an *anodyne* may be added to the diaphoretic mixture, and taken every four hours. If no sign of cerebral or pulmonary affection appear, the *hydrarg. cum creta* may be substituted for calomel, in the night-powder. It is in this period, that the treatment recommended by Dr. Pearson is most serviceable. This consists of an antimonial *emetic*, followed by a draught containing a drop of tincture of *opium*, five drops of *ipecacuanha* wine, and two grains of *carbonate of soda*, for a child of one or two years of age. This draught is to be repeated every four or five hours for several days; the bowels being kept open by rhubarb and calomel. As the cough declines, he lessens the opiate, and gives *myrrh* in place of the ipecacuanha wine. This treatment is excellent for children of three or four years of age or upwards: but until they reach two or three years, opium ought not to be given. For those of the age mentioned by Dr. Pearson, I consider the extract or syrup of *poppy*, or *conium*, or *henbane*, to be preferable. The *liquor potassæ*, also, will be often advantageously substituted for the soda. The *decoctum senegæ*, or the *infusum valerianæ* may be given in this and the next stage with some aromatic water, and an antispasmodic. It will be sometimes of service, even in this stage, to exhibit an *emetic*, if the fits do not terminate in vomiting; and, unless the attack is slight, the same *diet* and *regimen*, as directed in the first stage, should be continued in this. A principal indication in both is to watch the first sign of visceral disease, and to oppose its accession by leeches applied in either of the situations just named, and by emetics. In both periods, also, advantage will accrue from the warm semicupium or pediluvium at bed-time; but, unless the case become severe, it will only be occasionally required. — The excretions should always be promoted by mild and stomachic purgatives.

43. *c.* In the *third stage*, the chief indications are to strengthen the system, and to supersede the convulsive character of the affection, by giving *tonics* with *antispasmodics* and *anodynes*. The gentler tonics may be first employed, and successively those which are more energetic, in conjunction with preparations of *poppy*, or with

paregoric, or with *conium, hyoscyanus, laurel water*, &c. There are numerous medicines belonging to these classes that may be given with great advantage in this stage, but they will be noticed hereafter.—*Tonics*, as well as antispasmodics or anodynes, will be advantageously exhibited with the *alkaline subcarbonates*, or with *liquor potassæ*, or BRANDISH's alkalinesolution; and *purgatives* beneficially conjoined with vegetable bitters or other tonics. If the disease assume a periodic or intermittent type, the preparations of *bark* or *quinine* should be prescribed.— It is principally in this stage, that *change of air* proves so serviceable. It should not be neglected, particularly when this period and convalescence are protracted. In both this and the preceding stage, *embrocations* or *liniments* of a rubefacient and antispasmodic kind (see *Append.* F. 295, *et seq.*), applied to, or rubbed upon, the spine, will prove very serviceable.—*Sinapisms* will also sometimes be of use, especially in threatened bronchitis; and, in young, delicate, or irritable children, are preferable to blisters and the tartarised antimonial ointment, from which I have seen dangerous consequences accrue in patients of this description.

44. ii. *Complicated Hooping-cough.* — *A.* The most common complication is with *inflammation of the bronchial mucous membrane.* But this may not be the only associated inflammation; for *pneumonia*, or *pleuritis*, or even both, may be superadded to it, — a contingency to which the practitioner should be always alive. If *simple bronchitis* (§ 6.) be alone present, *local depletions*, in addition to the treatment already directed, must be prescribed; and *antimonial wine*, with the solution of the acetate of ammonia and camphor julap, should be taken every third or fourth hour. In young children, however, ipecacuanha wine should be preferred to antimony. A small dose of calomel, with or without ipecacuanha, rhubarb, or jalap, may be given every night, or night and morning, according to circumstances; guarding, however, against too great an action on the bowels. After depletions have been sufficiently employed, *sinapisms* or *blisters* applied for a few hours, or until erubescence of the surface is produced, and then followed by warm poultices, will be very serviceable. The warm *semicupium* may also be resorted to at bed-time. An ipecacuanha *emetic*, when expectoration is difficult, or twice or thrice a week, will also be beneficial. After the inflammatory symptoms are removed, any of the *anodynes* recommended above may be added to the diaphoretic mixture, an *embrocation* or *liniment* (F. 297. 300. 311.) applied along the spine, and the complaint treated, in the *second* and *third stages* especially, as advised for the simple disease.

45. *B.* In the complication with *pneumonia* or *pleuritis*, or with both (§ 14—18.), more decided *depletion* will generally be requisite, than in the bronchitic form. But it must not be overlooked, that these inflammations are seldom present in pertussis without more or less bronchitis. In this, as in the other pulmonic complications, *cupping* over the sternum, or between the shoulders, is a preferable mode of depletion to the application of leeches; and, in a far advanced stage of these inflammations, either after blood has been freely abstracted, or when excessive secretion into, or accumulation of viscid fluid in, the bronchi threatens suffocation, *dry cupping* between the shoulders is the next efficient means to a stimulating emetic. A purplish hue of the lips or cheeks, and dilatations of the nostrils, should not prevent depletion, if it is otherwise indicated, particularly in plethoric children, if it have not already been practised, and if the skin be hot and the pulse not much reduced in strength. When the substance of the lungs, or pleura, becomes inflamed, *calomel*, with or without ipecacuanha, should be given in larger and more frequent doses, than when the bronchi only are implicated, and the diaphoretic mixture should contain an antimonial preparation. This last, however, ought to be given with caution in infants or young children, for I have seen most serious effects produced in them by large doses of tartarised antimony, particularly when too often exhibited, or too long persisted in. In this complication, *sinapisms* and *blisters* prescribed as above (§ 16.) are beneficial after vascular depletion has been pushed sufficiently far; but, in many cases, much greater benefit will accrue from the application of the *warm turpentine epithem* on the chest or between the shoulders, or from one of the *liniments* (F.297. 300. 311.) already noticed, employed in the form of an embrocation.—Having removed the existing complication, the subsequent treatment must entirely depend upon the peculiarities of the case. The *diet* and *regimen* should be strictly enforced, and the patient kept in a mild and equable temperature. The semicupium, or warm bath, gentle *diaphoretics* with *diuretics* and anodynes, and, as the disease declines, mild *tonics* with *sedatives* and *antispasmodics*, will also be of great service. The excretions should be kept free, and change of air advised as soon as it can be safely attempted.

46. *C. The complication with cerebral affection* must be promptly met by the application of *leeches* behind the ears or to the occiput, or by *cupping* in this situation or on the nape, according to the age of the patient and the severity of the complication. Whenever the simple form of pertussis has presented such severity as to render the occurrence of pulmonic or cerebral affection at all probable, and more especially if the child have been plethoric, I have always directed *leeches* to be applied behind the ears or to the occiput, influenced by the views as to the pathology of the complaint already stated; and I have had the greatest reason to strongly recommend this practice. When hooping-cough is aggravated by *teething*, the cerebral complication should be dreaded, although neither *convulsions*, nor any other very prominent symptom of it, may have appeared. In these cases, the gums ought to be attentively examined, and scarified as they may require it. If the infant be at the breast, the nurse's milk and health should receive attention. The secretions and excretions of the patient must be most actively promoted by full doses of *calomel* with *James's powder*, by *purgatives*, and cathartic enemata. The temperature of the head should be reduced by the *cold affusion* on it, or by cold-sponging whenever either becomes necessary, and the means advised for *Inflammations of the* BRAIN (§ 191.), and for *Acute Hydrocephalus* (see DROPSY *of the Head*, § 260.), ought to be employed according to the circumstances insisted upon at these places. The objects are to remove incipient mischief, and to

prevent thereby the accession of a formidable malady, by a prompt application of efficient means. To wait until the coming evil has fully declared itself, is to sacrifice the principal chances of success; for all cerebral affections that supervene during pertussis are much more dangerous than those which occur primarily. As soon as the complicated affection is removed, change of air should be recommended. Nothing is so advantageous as a complete change of air for children treated in London, or in other large towns.

47. *D. Infantile remittent fever* generally does not appear in connection with pertussis until an advanced stage of the latter. Other associated affections, as *chronic pulmonary disease, curvatures of the spine, rickets, affections of the joints, enlargement of the mesenteric or of the absorbent glands, &c.*, are sometimes also met with in protracted cases of hooping-cough, or in the stage of decline, particularly when the disease has been neglected, or when the morbid affection has been perpetuated by habit, or by the neglect of such means as are calculated to break the chain of disordered action. They often also may be traced to constitutional vice or predisposition, and to neglect of the excreting functions. Under whatever circumstance, either these or the remittent fever may occur in the advanced course of hooping-cough, debility is a principal element of the complicated malady. The functions of digestion and respiration, and consequently assimilation and nutrition, having been more or less impaired during the early stage of the primary disease, inherent vice, or an existing disposition to disorder, the more readily manifests itself. As constitutional power sinks, maladies, which most commonly arise from debility, make their appearance; the particular malady being determined in its occurrence by hereditary taint, or by previous disorder. In many cases, the superinduced affection is merely a sequela of pertussis; but in others, the characteristic symptoms of the primary disorder still continue in a very pertinacious manner.

48. The remittent febrile disorder depends, in several instances, upon chronic irritation of the digestive mucous surface; in others, upon the state of the season or weather, and the influence of exhalations from a humid soil, or upon a moist and cold atmosphere; and in some, upon both conjoined. But whatever may be the source, it cannot be doubted, that debility is an important part of the disorder, and that the alvine secretions and excretions are much disordered. At the same time, therefore, that a treatment appropriate to the affection of the digestive canal is requisite, the state of constitutional power must receive attention. *Purgatives* are generally necessary in this complication, especially at an early period of it; but they ought to be of a stomachic kind, or combined with *tonics*, and neither be too irritating, nor too pertinaciously directed. The compound infusions of gentian and of senna, with sulphate of potash; rhubarb with this latter, in an aromatic water; hydrargyrum cum creta, or blue pill, with ipecacuanha, at bedtime — either of the preceding, or castor oil, being taken in the morning; are amongst the most suitable purgatives; and they should be repeated according to the state of the stools. If the bowels be irritable, or dysenteric, a full dose of calomel or hydrarg. cum creta, with the compound ipecacuanha powder, should be first given, having in some cases premised an ipecacuanha emetic. Some hours afterwards, a dose of castor oil ought to be taken, and its operation promoted by an emollient injection. After the intestinal canal is evacuated, irritation should be allayed by mild tonics, conjoined with aromatics, absorbents, sedatives, or antispasmodics, according to the peculiarities of the case. Preparations of cinchona, quinine, chalybeates, &c. will subsequently be of service. The decoction of bark, or any tonic infusion, will be advantageously given with liquor potassæ, or Brandish's alkaline solution; and afterwards the ammonio-chloride or potassio-tartrate of iron, and change of air, will generally prove most beneficial.

49. Although this treatment is recommended, chiefly with the view of preventing hooping-cough from lapsing into, or becoming associated with, infantile remittent, and of removing this complication, yet it will be equally serviceable in the prevention of the other *sequelæ* of the complaint mentioned above (§ 47.). When *affections of the joints, rickets*, or *mesenteric disorder* either supervene upon, or follow, an advanced stage of pertussis, the preparations of *iodine*, and other means directed for these complaints, should be resorted to. *Affections of the spine* are generally owing to weakness of the muscles and ligaments of the vertebral column, induced by this disease; or to scrofulous inflammation of some portion of the column itself. When the disorder is attributable chiefly to the former of these causes, then the *tonics* already recommended, *salt water bathing*, *sea air*, and *frictions* with stimulating liniments along the spine, will be very serviceable; and when the more solid structure of the column is implicated, then the preparations of iodine, Brandish's alkaline solution, or the *liquor potassæ*, and change of air, should be severally prescribed, as circumstances will suggest.

50. iii. *Of the more Specific Modes of Treatment advised for Hooping-Cough, and the Circumstances in which they are admissible or appropriate.* — Willis and Sydenham directed *bloodletting* in the plethoric and inflammatory cases, *emetics* of the oxymel of squills, *purgatives*, and *blisters* to the nape of the neck or between the shoulders. Willis also prescribed *tonics* during the decline of the complaint. He particularly notices the *Muscus pyxidatus*, or *M. Pyxioides*, the *Lichen pyxidatus* of Tournefort, or cup-moss, as a very popular remedy in hooping-cough. Gerarde remarks that "the powder of this mosse, given for certaine daies together, is a most certaine remedy for that perillous malady the chin-cough." Dilenius praised the powder of it, when frequently given; and supported his opinion by the authority of Willis and Gerarde. Other writers have prescribed it in the form of decoction in milk. Van Woensel (*Hist. de la Soc. Roy. de la Méd.* t. ii. p. 294.) recommended it in decoction, sweetened with syrup of mint. Baglivi employed also the *Muscus arboreus* and *M. querneus* in pertussis, in the form of decoction; and a syrup prepared from the decoction exists in the *Pharmacopœia Wittembergensis*, to facilitate its exhibition to children. Stoll (*Rat. Med.* vol. vi. p. 6.) found these mosses or lichens, particularly that growing on the oak, veiy serviceable in the hooping-cough which was epidemic in Vienna in the spring of 1775; Frank also praises it.

51. De Haen, in a letter written in 1747 to Van Swieten, describes a very prevalent and fatal epidemic hooping-cough. Children from a few weeks to ten years of age were chiefly affected, but adults were occasionally also seized. When one child was attacked in a family, none escaped who had not had the disease previously. It was often protracted to three, four, or even six months. He states that vascular depletion in the plethoric, purgatives, ipecacuanha, anodyne emulsions, opiates, oxymel of squills, nitre, &c. were severally employed, but with no marked success. He subsequently, with his colleagues, Ouwens, Westerhoff, and Velsen, was induced to prescribe the *Kermes mineral*, by the benefit derived from it in spasmodic asthma. To a child of six months, he commenced with one grain in the 24 hours, given in sugar and divided into three powders,—to a child of one year, two grains, in the same period,—and to a child of three years, three grains, increasing the dose gradually and cautiously. The success of this medicine he describes as most astonishing. In another letter similarly addressed, in 1751, De Haen remarks that, although he had found the *Kermes mineral* of very great service in the hooping-cough of that autumn, it was less so than in the epidemic of 1747: and he adds—"Plerique vero curantur *Limacum** lacte coctarum largo atque protracto usu." (A. De Haen, *Opusc. quæd. inedita, &c. Cur.* J. Eyerel, P. i. Vind. 1795, p. 42. 173.) In another work (*Rat. Med.* t. iv. p. 121.) he notices a case in which the fit of cough terminated in suffocation: but the means usually resorted to in suspended animation having been employed, restoration and recovery took place.

52. Stoll states that he never saw sporadic cases of pertussis in Vienna up to the year 1777. The disease had previously appeared only in epidemic forms, and generally with modified characters. At some seasons the stomach, at others the head, and sometimes the lungs, were especially deranged. Occasionally it was attended by a miliary, and in some instances by a scarlet, eruption. In a few cases urticaria and erysipelas occurred. In Vienna and Hungary, it generally evinced a stomachic origin.—The epidemic of 1775 frequently affected adults. The paroxysms were most severe on alternate days, and during the night; and peripneumonia was a frequent complication. He states, that bloodletting, emetics, purgatives, emollients, and opiates, especially this last, were prescribed without benefit. Blistering, however, between the shoulders, and bleeding, were beneficial when the disease was about to pass into pneumonia. He observed the injurious effects of stimulating expectorants in favouring the developement of pneumonia, with which pertussis is so apt to become complicated.—Tonics were generally required, as early as debility became apparent; and, even after the disease was removed, they were often necessary. When the bowels were not freely open, they were conjoined with aperients.—In the epidemic of 1779, all the cases in which the fits terminated in vomiting recovered. Stoll found ammonia, gum ammoniacum, and Venetian soap, given in simple oxymel, or oxymel of squills, of service. Decoctions of emollient herbs and roots, and of the flowers of arnica, were also beneficial. Opiates were productive of mischief in many cases, and even of fatal effects in some, a glutinous effusion having been found in the bronchi of such cases.—During the epidemic in Copenhagen in 1784, Bang made trial of the *cicuta*, after the exhibition of *emetics*; but with temporary advantage only. Towards the decline of the disease, *musk* was found of service.

53. Dr. Huxham introduced the use of *mercurial purges*. After their operation he prescribed the *Peruvian bark*. Dr. Bisset commenced the treatment with an *emetic* of oxymel of squills, followed by rhubarb, manna, &c. As soon as the severity of the complaint began to subside, and the intervals between the fits to be prolonged, he gave the bark.—The propriety of having recourse to *emetics* was advocated by Hoffmann, Forbes, Aaskow, Navier, Amstein, Hufeland, and others. The substances usually employed as emetics were ipecacuan, tartar emetic, Kermes mineral, and oxymel of squills. They were generally exhibited at the commencement of the treatment, and occasionally in the course of the complaint. Lafosse and Remer gave them only at the commencement. Ipecacuanha was preferred by Linnæus, Aaskow, Thilenius, Weber, and many others; and oxymel of squills by Melzer.—Stoll considered emetics to be especially serviceable in hooping-cough during summer or autumn. Struve directed them in the evening; and Sims, after bloodletting.—Lettsom believed them to be useless, and Jones and Niemann to be absolutely injurious. Burton was amongst the first to condemn them, and he no less objected to bloodletting and cathartics, unless in inflammatory cases. In their stead he prescribed a mixture, the most active ingredient of which was tincture of cantharides. There can be little doubt of emetics having been occasionally abused by inappropriate exhibition; but experience has proved them to be most serviceable in this complaint, when judiciously employed.—At the present day, the means advised by Borsieri are the most generally applicable, and therefore the best, as far as it goes, that can be adopted. He prescribed a smaller or larger emission of blood early in the disease; a gentle emetic, occasionally repeated, where there is no symptom forbidding it; aperients of calomel, rhubarb, or manna, and external irritants. The only fault that can be found with this treatment, is the neglect of demulcents, anodynes, and antispasmodics, which are very generally beneficial in an advanced stage of the complaint.

54. Dr. Darwin insisted upon the frequent occurrence of peripneumonia during hooping-cough; and he therefore directed *leeches*, to prevent, as well as to remove, this complication. After evacuating the bowels, and giving diluents, and when the complaint had reached the second stage, he prescribed, for a child of about three years, a sixth of a grain of calomel, a sixth of a grain of opium, and two grains of rhubarb, twice a day. The only objection to this treatment is the too general use of opium

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* Appended to a case treated by Stoll, the history of which is given by Eyerel (*Op. cit.* t. ii. p. 184.), is the following note: — Decoctum *limacum*, in epidemica tussi convulsiva egregium et unicum sæpe fuit remedium, teste Haenio, qui a fœmina rustica Hagæ Batavorum id didicit. Adfuere aliæ epidemiæ ubi nil juvit, sed ubi Kermes mineralis et opium omnem absolvit paginam,—Decoctum hoc limacum per octo dies repetatur.

and the amount of the dose of it, for a child: in combination, however, with calomel, it is much less injurious than when given alone. He likewise employed antimonial emetics, mild cathartics, cool air, repeated blisters, or the tincture of cantharides internally, warm bathing, the inhalation of the steam of warm water containing a little vinegar, opiates in small doses, and digitalis. He prescribed digitalis, whenever a tendency to inflammation, or to effusion, or to pulmonary consumption appeared. He considered, with much justice, *diuretics* to be more or less useful in this, as in other disorders implicating the respiratory organs. Dr. Elliotson has very properly contended, that, wherever there is oppression of breathing, with violent spasmodic attacks of cough, accelerated pulse, and sonorous or crepitous rattle, inflammation of the respiratory organs is present, and should be treated by bleeding, by emetics, and by calomel. In such cases, sedatives and antispasmodics ought not to be resorted to, until inflammatory action is removed, and the secretions and excretions are freely evacuated.—It is unnecessary to allude further to the various modifications of treatment adopted by other experienced physicians. I shall, therefore, only notice some of the principal remedies prescribed for this complaint.

55. iv. *a. Bloodletting* was directed early in hooping-cough, by the great majority of writers, since the time of Sydenham to the present day; and frequently even in slight and simple cases, as a precautionary measure, particularly in plethoric habits. Lettsom has justly remarked, that, if it be not resorted to early in the complaint, it is seldom of service at an advanced period; but cases in which inflammatory affections of the lungs or brain arise at this period, furnish exceptions to this rule. Stoll prescribed depletion chiefly when the lungs became affected. Hufeland directed *leeches* to the chest; and Webster, to the temples, in most cases. I have seldom omitted to apply them behind the ears, or between the nape and occiput, or to prescribe *cupping* in this situation, at an early stage, influenced by the reasons stated above (§ 35.).— Of *emetics*, mention has already been made (41. 44.). — *Purgatives* have been employed chiefly with the view of evacuating accumulations of fæces, and of promoting the secretions and excretions. *Calomel* has been very generally recommended, both as an aperient and as an alterative. Fischer and Hargens gave it alone; but it has been more generally conjoined with rhubarb or some other purgative; and, in the inflammatory complications, with James's powder, ipecacuanha, &c. Darwin and Stroem prescribed it with rhubarb and opium; in which combination it is often beneficial at an advanced stage, and in patients above four or five years of age. The frequent use of *laxatives* or mild purgatives has been much insisted upon by Michaëlis and Kortum. — *Cathartic* or *irritating enemata* have been resorted to by Holdefreund and Hufeland.

56. *b. Diaphoretics and expectorants* have been generally employed through the course of the complaint; the former at the earlier, the latter at more advanced, periods. Some of these medicines promote both perspiration and expectoration, and are hence the more serviceable in severe or complicated states of the complaint. — *Antimonials*, in small doses, were praised by Fothergill, Weber, and many others. The solution of tartar emetic was employed by Hirschel; the golden sulphuret of antimony was preferred by Closius and Hannes. Van de Sande and Unzer gave it after having premised emetics, and Holdefreund conjoined it with sugar of milk. — The *Kermes mineral* was prescribed by De Haen, Hargens, Kortum, Hinze, and Styx. Quarin gave it with the flour of sulphur, gum-arabic, and extract of liquorice; but, although formerly in great repute in febrile and pulmonary diseases, it is now seldom employed. The following powder was once much used on the Continent for the cure of this complaint: —

No. 257. ℞ Kermes Mineralis, Pulv. Ipecacuanhæ, āā gr. j.; Ocul. Cancror. pulv. et Pulv. Acaciæ āā ℈ j. Tere bene, et divide in Cartulas vj., quarum capiat unam sextis horis.

57. This dose was prescribed for a child of one or two years. Much of the virtues of these powders was clearly attributable to the *ipecacuanha*, which is one of the most serviceable medicines employed for hooping-cough. — Hennings and Keutsch relied chiefly upon it, and gave it in minute and frequent doses. Hargens ordered it in considerable quantities; Krebs, in the form of infusion; Vogler, with opium, magnesia, gum arabic, and sugar; and Pearson, with opium and soda. — *Ammoniacum* and *squills* have been used as expectorants; but they require much caution, for, in the more inflammatory states of the complaint, they may aggravate the disorder, or even favour the occurrence of inflammatory action, in plethoric habits, or when the phlogistic diathesis is present. The *oxymel of squills* was frequently employed as an emetic, and often with benefit. Hufeland and Sulzer gave it with cinchona and extract of hyoscyamus, in the advanced stages of the complaint.

58. *c.* Numerous *antispasmodics* have been prescribed in the *second* and *third stages*, on account of the convulsive character of the affection. — *Assafœtida* was recommended by Millar; but was considered useless by Hufeland. *Castor* was given by Morris and Horn; *musk*, by Conradi, Gesner, Wolff, Von Berger, Hufeland, and Horn. Marcus conjoined musk with the sulphuret of antimony and magnesia. The *oxide of zinc* was praised by Crell, Percival, and Hart. Scheidemantel very judiciously employed it after evacuations. Winckler and Tode gave it with cinchona; and Starke, with cream of tartar; but, from this combination, tartrate of zinc must have been formed. Hargens, however, considered it inefficacious. I have but little experience of its effects in this complaint. *Camphor*, in very small doses, with diaphoretics, at an early period; and in larger quantities, with anodynes, other antispasmodics, or tonics, is often of great service, particularly after moderate depletion and alvine evacuations. The *subcarbonates of the alkalies* were given by Hinze, Memminger, Pearson, and Keutsch, and are often important adjuvants, in conjunction with hyoscyamus or other narcotics, and with rhubarb or other aperients, in the treatment of the second and third stages. I have, however, often preferred the *liquor potassæ* or Brandish's alkaline solution; especially in the scrofulous diathesis, and in cachectic habits. The subcarbonate of *ammonia*, in small doses, and other preparations of ammonia,

are frequently beneficial in cases of debility at an advanced period, or when the complaint is protracted. *Muriate of ammonia* was recommended by Stoll, at an early stage, with oxymel. I have found it an excellent refrigerant antispasmodic and tonic, in several instances.

59. *d.* The most energetic *narcotics* and *anodynes* have been prescribed, with a view of allaying spasmodic action, and generally in conjunction with some one of the antispasmodics or diaphoretics already noticed. *Opiates* were given by De Haen, with camphor and musk; by Hufeland, in the form of Dover's powder; by Jacob, with pectoral elixirs and spirits of nitric æther; by Rüling, similarly combined, after four or five emetics; and by Lefosse and Lettsom, in the second and third stages, with cinchona. Willan employed a watery extract of opium; and Brera used it externally in frictions or in liniments. Of the various preparations and combinations of opium, the paregoric elixir is indisputably the best in hooping-cough, especially when given with an alkaline subcarbonate, in almond or mucilaginous emulsions. The extract of the *lactuca virosa* was praised for this complaint by Dr. Gumprecht and others; and it has been much employed by some practitioners. *Conium* was first prescribed for hooping-cough by Dr. Stoerck and Dr. Butter. It was afterwards used by Ranoë, Schneider, and Hufeland.— Lettsom and Hargens considered it devoid of efficacy. I have prescribed it in numerous cases, and believe it beneficial when its virtues are not injured by preparation or age. It should not be given in the first stage.—*Hyoscyamus* was recommended by Wolff, Wigand, and Joerdens; and by Fischer, with vegetable bitters. It is nearly as beneficial as conium; but, in some patients, it is more liable to affect the head.

60. *Belladonna* has been extensively tried by Continental physicians in pertussis, and the powder of its root was most commonly employed; particularly by Ranoë, Buchhaave, Frank, Meglin, and Ettmüller; and by Laennec after the operation of emetics. Schaeffer and Widemann gave it in large doses, and considered that it was quite a specific, particularly when administered in enemata. This is, however, a somewhat dangerous mode of prescribing it. The minute doses, recommended by Wezler and Hufeland, are much more judicious.—The extract of *tobacco* has likewise been prescribed by Gesner, Thilenius, and Hufeland; but it also requires much caution, and ought not to be tried with young children. The tincture of *Lobelia inflata* has been employed by Dr. Andrews, with benefit. When the convulsive cough is aggravated by the accumulation of viscid mucus in the bronchi, the exhibition of this medicine, until it produces vomiting, will be of great service. *Colchicum* was praised by Haden and Alcock; and, when cautiously given in conjunction with magnesia, or the alkaline carbonates, or with either of the antispasmodics noticed above (§ 58.) it is of service in the inflammatory complications; but it may be very injurious in other circumstances, and particularly in very young patients. The same remarks apply to *digitalis*, as prescribed by Drake and Darwin. *Hydrocyanic acid* has also been recommended by Dr. Granville and Dr. Elliotson. I have seen much benefit derived from it, in the advanced stages of the complaint, particularly when given in conjunction with camphor, or with gentle tonics or demulcents. It should be most cautiously tried, if tried at all, with young children. Dr. Elliotson, however, remarks, that a minim may be added to an ounce or two of almond emulsion, and a teaspoonful of this given them three or four times a day. *Laurel water* was much employed in hooping-cough by Continental physicians, and is still preferred by many to prussic acid.

61. *e.* Amongst *stimulants*, the tincture of *cantharides* has been most frequently employed. It was praised by Forbes, Schaeffer, and Ploucquet; and was prescribed with camphor and extract of bark, by Burton; with antispasmodics and anodynes, by Wolff, Widemann, and Hufeland; with preparations of cinchona, by Chalmers; and with these and paregoric, by Lettsom and Graves. I have prescribed it in a number of cases, and have found it diminish the frequency and severity of the fits, in the nervous states of the complaint, particularly when it occasioned irritation of the urinary organs. The extract of *nux vomica* was recommended by Michaëlis and Hufeland, conjoined with the extract of *Carduus benedictus.* I have tried it with manifest advantage, in circumstances similar to those in which cantharides was employed. But neither the one nor the other ought to be resorted to in the first stage, or in the inflammatory complications. *Guaiacum* has been prescribed for pertussis, chiefly by Hufeland and Veizhans; and *saffron* with castor, after due evacuations, by Theussink and Hargens. *Castor* was itself much employed by Sauvages, Morris, and Horn; and a decoction of unroasted *coffee* was given by Hufeland. The *muriate of barytes* has also been noticed with commendation, by the writers just named.

62. *f.* The propriety of having recourse to *tonics* in the second and third stages, particularly the latter, cannot be disputed; but they ought not to be prematurely prescribed, especially in the second stage, and whilst a phlogistic diathesis is present even in the slightest degree. Of the various tonics, the preparations of *cinchona* are certainly the best. The infusion may be first given, conjoined with the solution of the acetate of ammonia, and subsequently the decoction with liquor potassæ or the subcarbonate of soda. The extract of conium or hyoscyamus, or paregoric elixir, may be added to either of these. *Bark* was strongly recommended by Quarin, Courbette, and Holdefreund. Hannes gave it with the sulphuret of antimony, and administered it in enemata; and Sauvages and Morris, with castor; Bisset, Stoll, Aaskow, Weber, and Michaëlis, very judiciously premised sanguineous depletions, emetics, and purgatives, before they ventured upon it. Murray and Hufeland gave it with cantharides in the latter stages. It is much more beneficial in some epidemics than in others. When the complaint is protracted, and assumes an intermittent or periodic type, particularly a tertian form, quinine, or cinchona ought never to be omitted.—The *arsenical solution* has also been employed in circumstances requiring the bark. It was much recommended by Ferriar and Simmons, and is undoubtedly of service in these: but it is not superior to cinchona; and in children, especially, it is a much more hazardous substance. — I have given the *sulphate of*

zinc with great benefit in some cases; and the *nitrate of silver*, triturated with *extract of hop* or of hyoscyamus, with equal advantage in others. The *sulphate of iron* was very favourably noticed by Dr. Stanger, and is an excellent medicine in the third stage, or purely nervous state of the complaint; but it is not superior to the other preparations of iron, particularly the *ammonio-chloride*, and the *potassio-tartrate*.

63. *g*. There are various other medicines which have been employed internally against hooping-cough; but these require only a simple enumeration. Of the *Lichen pyxidatus*, mention has already been made (§ 50.) The *Lichen cocciferus* was recommended by Forbes and Von Woenzel; and the *L. Islandicus* by Weber. The *Ledum palustre*, *Tilea Europæa*, and *althæa officinalis* were prescribed by Wahlbom, Linnæus, Walter, and Wahlin; the *Geum urbanum*, by Keck and Buchhaave; *Phellandrium aquaticum*, by Van der Bosch; an infusion or extract of the *Narcissus pseudonarcissus*, by Dufresnoy; an extract of the *Mesembryanthemum*, by Wendt; and an extract of the *Cardamine pratensis*, by Comhaire and Veillecheze.—*Isinglass* was used in this complaint, by Heineken and Gautieri; *acetate of lead*, in small doses, by Forbes; *oxide of zinc*, with cicuta or belladonna, by Guersent, diluted *acetic acid*, with sugar, by Hannes; *sulphur*, by Sydenham, Quarin, and Unzer; and the *sulphuret of potass*, by several Continental physicians.

64. *h*. There are few complaints in which *external medication* has been so extensively or so beneficially employed, as in this. Although the *inhalation* of simple or medicated watery vapours does not strictly come under this head, I may here state, that it has been advised by Pearson, Darwin, and others. The observations as to this practice, in the article on *Inflammations of the* Bronchi (see that article), and as to the medicines that may used in this manner, entirely apply to hooping-cough. In the early stage, the vapour to be inhaled should be either simple or merely emollient. In the latter stages it may be slightly impregnated with camphor, or with some narcotic; but this practice can seldom be adopted for young children. The inhalation, in early or inflammatory states of the complaint, of stimulating vapours, is always injurious.

65. *i*. *External irritants* of various kinds have been prescribed. *Blisters* were applied to the chest, and between the shoulders, by De Meza, Paldamus, Quarin, and others; but the precautions stated above (§ 44.) should be observed, particularly in cases of infants and young children. Knebel directed *rubefacients* to the nape of the neck; Pelargus and Hufeland, to the lower extremities; Henning and Hecker, to the epigastrium; and Durr, to the soles of the feet. Various substances have been employed as external irritants. Henning recommended a cataplasm containing scraped *horseradish*; Struve, a liniment with tincture of *cantharides* and *tartar emetic*; and Zadig, the tincture of *ginger* applied to the epigastrium. Autenrieth prescribed an ointment containing tartar emetic to be rubbed upon the chest, or between the shoulders, or upon the epigastrium; and this practice was adopted by Kelch, Merrem, Nolde, and Michaëlis; but Horn and Schneider found it productive of little or no benefit. Autenrieth has received the credit of being the first to employ tartar emetic as an external irritant; but it was thus recommended long previously, by the older Monro. I have seen the incautious use of this ointment productive of dangerous, and even of fatal sloughing, in debilitated or cachectic children and infants. Loebenstein-Loebel advised a liniment containing a solution of *phosphorus* in oil of cummin and camphor to be applied on the epigastric region. From an extensive experience of external irritants in the treatment of pertussis, I prefer the *semicupium* or *pediluvium*, mustard and salt having been put into the water; the occasional application of a *mustard poultice* to the chest or epigastrium; *dry cupping* on the nape of the neck or between the shoulders; or *friction* with the following *liniment* along the spine, or the application of a piece of flannel moistened with it, on the sternum or epigastric region, according to the peculiarities and complications of the case:—

No. 258. ℞ Linimenti Camphoræ Comp., Linimenti Terebinthinæ, āā ℥ j.; Tinct. Capsici ʒ j.; Olei Caojuputi ʒ ss. vel ʒ j. Misce. Fiat Linimentum, vel Embrocatio.

66. Since the introduction of *vaccination*, it has been proposed by Okes, Cleeve, and Moutain, to inoculate with the vaccine matter as a preventive and as a cure of hooping-cough. This subject has been recently agitated, but without any conclusive evidence of benefit having been derived from the practice.

67. *k*. In the second, but especially in the third, stage of the disease, *change of air*, particularly to the sea-side, as recommended by Gregory and Hufeland, and *sea-voyaging*, are of the utmost advantage. For patients residing on the sea-coast, *frequent excursions* on the water will be highly beneficial, especially if nausea or vomiting be thereby produced. *Salt-water bathing*, commencing with the warm or tepid bath, and passing gradually to the cold bath or shower bath, will be found very serviceable, if no complication forbid it. The *diet* of the patient, in the first stage, should be antiphlogistic; and in the second and third it ought to be very light, chiefly farinaceous, and moderate in quantity. Over-distention of the stomach aggravates the fits, and favours cerebral congestions. Exposure to cold, or to vicissitudes of weather or temperature, running, &c., also, may induce inflammatory complications. Young children ought to be carefully watched at night, and be raised up as soon as the fit is threatened. Whenever the phlegm obstructs the fauces, it should be removed by a small thin piece of whalebone, bent in the form of a tongue-scraper, or by the finger of the nurse.

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HYDATID. — Syn. *Hydatis* (ὑδατις, a vesicle, from ὕδωρ, water). *Acephalocystis*, *Acéphalocyste* (from α, privative, κεφαλὴ, the head, and κύστις, a vesicle — a vesicle without a head), Laennec. *Vessie sans adhérence*, Cruveilhier. *Echino-*

coccus Hominis, Rudolphi and Bremser. *Polycephalus humanus, P. Echinococcus*, Zeder. *L'Echinocoque de l'Homme*, Lamarck. *Fischiosoma*, Brera. *Hydatide*, Fr. *Wasserblasse, Blasenwürm*, Germ. *Idatide*, Ital.

CLASSIF. — I. CLASS, V. ORDER (*Author*, in *Preface*).

1. DEFIN. — *Unattached vesicles, possessing a proper vitality, but dependent upon the parent body for the situations and conditions of existence.*

2. The term *Hydatid* has been very loosely employed by most writers, and even by many of the present day. It has been used by some as a generic appellation, not only for the several species of vesicular worms, or vesicles with one or more distinct heads, but also for the vesicular bodies now under consideration; and by others the name has been very improperly extended to those simple *cysts* which are produced from, and connected with, the surrounding tissues. In this article I shall consider only those vesicular bodies which do not possess distinct heads, but which present signs of a proper vitality, as constituting *true hydatids;* and shall refer the species, *Cystocercus, Polycephalus*, and *Ditrachyceros*, arranged by CLOQUET, KERR, and others, under this head, to that of *vesicular* WORMS. As to the species *Echinococcus*, described by RUDOLPHI, ZEDER, and others, I believe it, with BRERA and BREMSER, to be merely a variety of the *acephalocystis.* Simple *cysts*, or pseudo-hydatids, are altogether distinct formations from those under consideration; but I shall also briefly notice them. (See art. DISEASE, § 113—115.)

3. The name *Acéphalocyste* was applied by LAENNEC to an organic production, consisting of vesicles or spheroidal globules contained in a distinct cyst, which isolates them from the surrounding tissues, and with which they have no kind of connection. Although these productions scarcely merit to be elevated to the rank of a distinct species in animal existence, yet they must be considered, in pathology, to possess an individual vitality. They thus form one of the several species of *parasites*, to which the human frame often furnishes origin and nutrition, and which not infrequently destroy the parent body. (See PARASITICAL PRODUCTIONS.) When it is considered that they present nearly the same form and appearance, that they are unconnected with the surrounding tissues, differing only as to size; originating, without any determined cause, in the very substance of our organs; developing and multiplying themselves; and manifesting their existence only by the compression of adjoining structures, whence often result the most serious effects, and even death itself; it must be admitted that they deserve a due share of attention.

4. *Hydatids* were probably known to the ancients, although imperfectly; as HIPPOCRATES, CELSUS, GALEN, and ARETÆUS mention the existence of cysts in many of the states of disease in which they are met with in the present day; but no precise description of them was given until 1685, when HARTMANN directed attention to their animalcular nature. In 1691, Dr. TYSON published a paper (No. 193.) in *The Philosophical Transactions*, "to prove that hydatids, often met with in morbid animal bodies, are a species of worms or imperfect animals." Since that time, they have been particularly examined by PALLAS, LINNÆUS, MÜLLER, HUNTER, MONRO, GOEZE, BLOCH, LAMARCK, CUVIER, BRERA, RUDOLPHI, ZEDER, LAENNEC, BREMSER, CLOQUET, CRUVEILHIER, and others.

5. I. DESCRIPTION OF HYDATIDS, AND OF THE CYSTS CONTAINING THEM. — M. CRUVEILHIER remarks, that, if we represent to ourselves soap-bubbles of various sizes, the contained air being replaced by a fluid of perfect limpidity, the envelope formed by a film of coagulated white of egg, we shall have a very exact idea of acephalocystes. They vary in size from a millet seed to that of the largest orange; their form is spheroidal; and their specific gravity is nearly the same as water, although they generally sink when plunged in this fluid. When compressed, they resume their spherical form as soon as the pressure is removed. They are in general transparent and clear; sometimes only translucent; it is but rare that the fluid they contain is at all turbid. The various tints they present depend upon their envelopes, which have sometimes an opaline hue, either in particular points, or throughout their surface. Frequently semi-transparent flocculi are seen swimming in the liquid, and appear reticulated or plaited. M. CRUVEILHIER considers these as the débris of the internal pellicle of the hydatid, and the result of changes after death. Their external surface is generally smooth, uniform, and without crochets, or suctoria; and when their fluid is evacuated, they present neither heads nor mouths — *Hydatis lævis.* — If, therefore, they are to be considered as possessing individual animal existences, they are the simplest and lowest of animal creation. Examined with the microscope, the opaline appearance of their parietes proceeds sometimes from a thickening of the membranes forming them; at other times, from small whitish and hard granulations on their interior surfaces. They are without the smallest appearance of vessels of any kind.

6. When punctured, the contained fluid escapes in a jet tolerably strong and continued; the envelope, eminently elastic, contracts, and presents only about one third of its former capacity, and acquires double or treble its former thickness. Although transparent at first, it becomes semi-opaque, or opaline; and, although very extensible and elastic, it tears readily when it reaches the limits of extension. The fluid of an hydatid is not coagulated by heat, but it contains a little albumen and some salts, amongst which the chloride of sodium is predominant. The membrane, according to M. COLLARD, is composed of — *first*, an albuminiform substance, which, however, differs from albumen in being soluble in hydrochloric acid: *second*, of a substance analogous to mucus, but differing from mucus in its insolubility in alkalies; in its want of action on the acetate of lead; in its great solubility in the hydrochloric, sulphuric, and nitric acids, without the disengagement of gas; and in the circumstance of water restoring its physical and chemical properties after it has been dried. From these M. COLLARD infers, that the hydatidic parietes consist of a peculiar substance.

7. Anatomically, they are composed, according to M. CRUVEILHIER, of four or five membranes, or laminæ, of unequal thickness, each membrane also varying in thickness at different points; whence result their various degrees of opacity and trans-

parency. The small whitish granulations, already mentioned, are frequently found on the interior surface of the larger hydatids; but they are often wanting, especially in the smaller. They possess no regular form, but are elevated on the internal surface, carrying before them the internal pellicle. HIMLY says that some hydatids possess another internal membrane, which is remarkably thin, but presenting here and there, or in groups, corpuscles of a glandular appearance; and that these inclose hydatids of a minute size, thereby illustrating the system of the inclosure of germs. BREMSER has seen, in free hydatids, globules likewise unattached, in the interior of which still smaller globules existed; successive generations thus appearing in the same cyst. Dr. JOHN HUNTER and LAENNEC also consider the granulations or attached corpuscles to be young hydatids; and the numerous minute vesicles observed with the microscope diffused through the fluid contained in a hydatid, to be of the same nature. Dr. HUNTER remarks, that, in their growth and decay, they pass through various stages: they are at first found floating in the fluid that fills the hydatid, and afterwards attached to its coats. The hydatid, thus pregnant with young, adheres to the neighbouring parts, increases in size, and becomes itself a sac, containing numerous small hydatids. These, after a certain time, decay, and the skins or empty bags are squeezed together into a substance resembling isinglass; and it is probable that they undergo still further changes.

8. Besides these minute granulations on the interior surfaces, and still minuter vesicles detected in the contained fluid, and considered by M. CRUVEILHIER to be the débris of the internal pellicle, as described above (§ 5.), M. LAENNEC has remarked, in some instances, small germs or sprouts of an irregular form or size on the exterior surface. These he considers as nascent hydatids, which in a certain stage of growth are detached, and increase the number in the surrounding fluid. According to these writers, and to Dr. BARON and Sir A. COOPER, hydatids may be so produced as to form a number of concentric layers, resembling the crystalline lens, or the coats of an onion, with the fluid interposed between each layer. In such instances, it is to be presumed that the most internal is the last formed, and that the more external become condensed, and ultimately disrupted and altered by the developement of those in the centre.

9. M. CRUVEILHIER distinguishes hydatids into *two varieties*—the *solitary* and the *multiplied*—the *Acephalocystis eremita vel sterilis*, and the *A. socialis vel prolifera*. The first is most common in the lower animals, the second in man. The former rarely is confined to one situation, organ, or part, but invades several organs, or even a number of parts at the same time; the latter is as rarely produced in several parts of the same body, or even in different parts of the same organ.—*a*. The *solitary hydatid* is often found in thousands in the lungs, the liver, &c. of ruminants. M. CRUVEILHIER observed them at the same time in the lungs, the spleen, the kidneys, and the heart, of both sheep and oxen. The enveloping pellicle of the hydatid is altogether similar to that covering the interior of the cyst, but is without any kind of adhesion to it. This pellicle is semi-transparent, and presents a number of whitish points or granulations. The inclosing *cyst* is generally fibro-cartilaginous, and is not always spherical. Sometimes one or several partitions separate the cyst into as many cells, in each of which a hydatid is lodged, and exactly moulded. The tissue of the organs surrounding these cysts is quite unaltered.

10. *b*. The *multiplied hydatids* are always in greater or less numbers. From an hundred to a thousand may be contained in the same cyst or sac, varying from the size of a millet seed to that of the closed hand. They swim in a fluid presenting varying appearances. Sometimes this fluid is perfectly limpid; at others it is yellowish, especially in the hydatidic cysts formed in the liver; and it occasionally is puriform or purulent; yet, in this latter case, the hydatids themselves usually preserve their limpidity,—a circumstance, amongst others, proving their independent existence. When the fluid of the cyst, in which the hydatids are contained, is otherwise changed, and especially when it becomes more consistent, or presents characters materially different from the above, the hydatids are disrupted, broken down, emptied, and apparently dead.

11. *c*. The *cysts* which inclose either variety (the solitary or multiplied) of hydatids, is generally strong and composed of several laminæ, which separate easily, and present the characters of fibrous tissue. They frequently contain cartilaginous or ossific patches; and the thickness of their parietes is usually in proportion to their size and age. They are externally adherent to the surrounding tissues by loose cellular substance; but they are occasionally attached more firmly by a cellulo-fibrous structure. The organ in which they are situated is commonly unchanged; but when pressure is exerted by them, the surrounding parts are atrophied, or converted into a fibrous substance. The internal surface of the cysts is often rugose, and rarely polished or quite smooth. It has not the appearance of sero-fibrous surfaces, and yet it secretes the fluid in which the hydatids swim. It sometimes presents cracks or crevices, or solutions of continuity, from the distention caused by the growth of the hydatids, and increase of the fluid filling the cysts.

12. The hydatidic cysts are lined by a membrane, similar in all respects to that which constitutes the proper parietes of the contained hydatids, and presenting the same elasticity, fragility, colour, and physical and chemical properties. This membrane may be separated into several lamellæ. Its thickness is in proportion to its capacity. Its external surface nowhere adheres to the parietes of the cyst, and its internal surface is quite smooth. M. CRUVEILHIER considers it to be a large hydatid, enveloping and containing those which are smaller. It lines not only the cysts of the multiplied hydatids, but also those of the solitary. In the former, however, its internal surface is studded with minute granulations, some of which are isolated, and the others agglomerated. These granulations, as in the case of those observed in the interiors of the larger hydatids, are doubtless the germs of the free and smaller hydatids.

13. When a morbid action exists in the parietes of the sac, or cyst, or when they secrete pus instead of serum, then the enveloping acephalocyst is detached, and its débris are found mixed with the puriform secretion. The granulations or germs

are also altered, and the contained hydatids are often more or less changed. In such cases, the morbid secretion from the internal surface of the diseased cyst is destructive to the vitality, first of the enveloping or parent hydatid, and consecutively of those which it contains.

14. The vitality and independent existence of hydatids are shown not only by their reproductive powers, but also by the preservation of the animal substances composing them from the changes, or the decomposition, which these substances always undergo when they lose their organic connection with living parts. Yet, although thus possessing a certain, but a low, amount of vitality, they cannot be elevated to the rank of animals; for they possess neither sensibility nor mobility, although their parietes present signs of organic contractility. They may be viewed, therefore, as the lowest or incipient states of separate animal organisation, from which there is a gradual rise in the scale of existence, through the vesicular and flattened parasitic worms, up to the more perfect animals.

15. *d.* Hydatids undergo many *consecutive changes*, some of which originate in disease, either of their containing cysts, or of themselves. Occasionally these cysts break, either exteriorly or into a serous cavity, or upon a mucous surface; and this occurrence may be either fortunate or fatal, according to the situation in which it takes place. If the rupture occurs on a cutaneous or mucous surface, the admission of air causes prolonged suppuration. If it occurs in a serous cavity, which is rarely observed, fatal inflammation is thereby occasioned. Frequently, however, owing to the death of the hydatid, absorption of the fluid in the cyst takes place; the parietes contract, and approach towards the centre; and the remaining contents become remarkably changed, and often assume a tuberculous, putty-like, cheesy, or purulent form, the hydatidic membranes being pressed together, or otherwise altered. According to RUYSH, BREMSER, and others, hydatids may thus degenerate into atheromatous, steatomatous, or melicerous tumours, especially when they occur in the ovaria. This opinion has been zealously and ingeniously argued for by Dr. BARON. He supposes that the hydatid, or vesicular form, is that in which tuberculous, scirrhous, sarcomatous, steatomatous, and fungous productions originate; and that the transformation may take place at any period, or may not occur at all. The co-existence of hydatids with one or other of these formations has been urged in proof of this doctrine; but there has been no evidence of any of these having originated in hydatids, nor has the transition of the one morbid structure into the other been even partially demonstrated. The co-existence of these different productions in the same subject, that is sometimes observed, and that furnished the chief basis of this doctrine, is merely a coincidence arising out of a fully ascertained circumstance,— that the same states of constitution, of vital activity, and vascular action, which favour the production of the one structure, also predispose to the other.

16. II.—PSEUDO-HYDATIDS, SIMPLE CYSTS, or *vesicles*, have been very commonly confounded with true hydatids. From this circumstance it will be necessary to take some further notice of them at this place, than has been taken in the article DISEASE (§ 113—115.). They are found either entirely or partially in contact with the adjacent tissues, are supplied by these with the fluid they contain, and are nourished by them. Dr. KERR has divided them into two varieties, viz. those which consist of *simple cysts*, or bladders capable of being detached without lesion of structure, and those which are *compound*, and which appear as diverticula from the subjacent membranous expansions, from which a separation at their bases cannot take place without laceration of a part essential to the integrity of one or the other.—*A.* Under the *former head* may be arranged—1st, those cysts met with under the common integuments, that contain a sebaceous, atheromatous, or meliceritious substance, secreted by the cyst, and causing its distention;—2dly, those cysts formed by complete obstruction of a canal conveying secreted fluids, as ranula, those found in the labial glands, and the surface of the kidneys, &c.;—3dly, those proceeding from the distention of cells naturally existing in organs, by a morbidly increased and altered secretion; as in ovarian dropsy, and disease of the thyroid gland;—and, 4thly, those serous cysts often found in the plexus choroides, sometimes in the eyelids, more rarely in the lungs, the female mamma, and other parts of the body. These last sometimes acquire a large size, especially when seated near the surface of any of the abdominal or thoracic viscera, and constitute encysted dropsy. The cysts belonging to this class are generally simple, distinct, and solitary. When two or more of them are developed in one part, as in the plexus choroides, the association is owing to the same cause which produced the one, having likewise operated in its neighbourhood. This has been well shown by Dr. HODGKIN. (*Med. Chirurg. Trans.* vol. xv. p. 266.).

17. The *formation* of this species of cysts, especially of those which cannot be referred to the obstruction of canals or orifices of ducts, has been a subject of much speculation. It has been supposed by some, that they are produced by the obstruction and consequent dilatation of absorbents, or of other vessels not admitting the passage of red blood. This, however, is only a supposition. In a paper which I published in 1821 (*Lond. Med. Repos.* vol. xv. p. 378.), I suggested their origin in effusion into one or more cells of the areolar tissue, the state of the effused or secreted fluid, and the changes in the tissue immediately surrounding and confining the fluid, preventing the diffusion of the secretion in the adjoining parts, and giving origin to the parietes of the cyst. If serum accumulates in one or more of these cells, owing either to morbidly excited action, or to impaired absorption, in connection with an impermeable state of the surrounding tissue, this latter will be impacted around the collected fluid, and the albuminous portion of this fluid will attach itself to and line the sides of the cavity thus formed. As the effusion increases, this cavity will enlarge; the parietes formed by the impacted areolar tissue will become firmer and denser; the albuminous portion of the secretion will continue to attach itself to the parietes, if it be in small quantity, where it will become organised, or even converted into a serous surface; and the cyst will present several coats or laminæ, thus produced from the condensed surrounding tissue, and from the successive depositions of albuminous pellicles on its internal surface from the secreted

fluid. At the same time, it is not improbable, that many of the simple cysts are actually formed before the fluid they contain, as supposed by BICHAT, and as admitted by me, in the article DISEASE (§ 115.). The fluid in the cyst, particularly when it is thick, or more remarkably albuminous, or muco-albuminous, may undergo various changes, arising either from its properties at the time of its secretion, or from the states of local and general action and of constitutional or vital power. These changes may also be further aided by partial absorption of its watery parts, or by the tendency of its chemical elements to form new combinations, when removed to a certain extent beyond the vital influence, and still subjected to an elevated temperature. To these circumstances may be attributed most of the appearances observed in the contents, as well as in the tunics, of the class of *simple cysts*, and described in the article DISEASE (§ 113—115.), whether the cysts are first developed as a serous membrane, or are formed by the fluid effused into the areolar tissue.

18. *B.* The *compound variety* of cysts (§ 16.) are those whose parietes possess the property of producing other cysts of a similar character to themselves, or, as Dr. HODGKIN has shown, other morbid growths, which, if they do not present, strictly speaking, the character of cysts, are nevertheless referrible to the same type or mode of formation. Cysts of this kind, like simple cysts, are found in different parts of the body, but are by far most frequently seen, acquire the largest size, and present the greatest variety of appearances, in connection with the female organs of generation. In this variety, elevations more or less rounded, and of various sizes, are observed projecting on the interior surface of the principal cyst, and are covered by a membrane continuous with that lining the interior of this cyst. Dr. HODGKIN remarks, that on making an incision into these projecting elevations, they are found to be cysts of a secondary order, filled by a secretion, often serous, but almost as frequently mucous. On an intimate inspection of those secondary cysts, the germs of other or tertiary cysts are also found projecting from their interior surfaces, upon which is reflected the lining membrane of the cyst in which they are contained. Secondary cysts sometimes afford as complete specimens of a reflected serous membrane, as either the pericardium or the tunica vaginalis; the lining membrane of the containing cyst corresponding to the reflected portion, as that covering the contained bunch of cysts does to the close portion. The proportion which the contained cysts bear to the cavity of the membrane reflected over them, is extremely various. Sometimes the fluid, especially when it is serous, nearly fills the containing cyst, whilst the bunch of secondary cysts is of very inconsiderable size. At other times, the principal cyst is almost entirely filled by those of the inferior order; in which case the nodulous or tuberose elevations found on the exterior of the former, are occasioned by the unequal developement of the latter. It may even happen, that the distention, caused by the growth of the contained cysts, is sufficient to produce a rupture of the containing cyst, which admits both of the escape of its fluid contents, and of the unrepressed growth of the secondary or tertiary cysts, which took their origin from its internal surface. As the inferior cysts themselves are found to contain, as Dr. HODGKIN has shown, a serous or mucous secretion, and very often to produce another order of cysts, possessing the same character with themselves, it is by no means surprising that these different orders of cysts, which sometimes have the appearance of delicate and pellucid vesicles, filled with clear and colourless serum, and possessed of the power of giving rise to a multitude of vesicles or cysts presenting the same character with themselves, should have been mistaken for true hydatids. But a little careful inspection would have shown that the bunches or clusters of secondary cysts are invariably attached to and continuous with the internal surface of the primary or containing cyst; and that delicate vessels ramify from the one upon the other.

19. It is reasonable to infer, that these compound cysts will present diversified appearances, and give rise to various changes, according to their duration, to the state of vascular action in the parts in which they are formed, and to the constitutional or vital power of the patient; and that, according to the alterations which may take place in these cysts and in their contained fluids, adventitious formations of various kinds, and even scirrhous and carcinomatous structures, may be ultimately developed. — My limits will not permit me to describe the various appearances which these compound cysts may present, in different situations, and at different epochs of developement, or to trace the various changes they undergo, and far less to speculate upon their transformations into malignant or other structures. I must, therefore, refer the reader to Dr. HODGKIN's ingenious and able paper on this subject.

20. III. TRUE HYDATIDS have been found in almost every organ or structure of the human body. Instead, however, of considering them at this place with reference to *their seats* in the brain, in the lungs, in the heart, in the liver, in the kidneys, &c. &c., I have, conformably with the plan of this work, noticed their occurrence in these organs, in the articles devoted to the pathology of the several viscera. In these articles, as well as in some others, the *symptoms* they occasion, and the *treatment* they require, in their various *localities*, are more fully and sufficiently discussed: I here confine myself to a general view of these subjects.

21. IV. REMOTE AND IMMEDIATE CAUSES. — *a.* Attention to the circumstances in which hydatids present themselves in man and in the lower animals proves, that they generally originate in whatever impairs vascular activity and vital power; and, of the causes which produce this effect, none are more influential than unwholesome and insufficient food, living too exclusively on vegetable diet, and residence in humid, cold, and low situations. Indeed, in the lower animals, they may be produced at will by insufficient nourishment, by humidity, and by food consisting chiefly of green succulent vegetables. Conjoined with these, debility arising from previous disease, convalescence from febrile or epidemic maladies, and the depressing passions, exert more or less power. There is reason also to infer that local injury, as well as local debility, has some share in determining the seat of these parasitic productions.

22. *b.* Various attempts have been made to account for their *origin*. BIDLOO believed them to arise from the dilatation of lymphatic vessels; the

valves forming a limit to the vesicles. M. Andral has recently attributed their origin to a deposit of a fibrinous clot in the areolar or other tissues. He supposes that a minute fibrinous concretion, secreted by blood-vessels in a state of morbid action, assumes an incipient form of organisation, and that hydatids are an advanced grade of such organisation. This supposition is supported by the well known fact that fibrinous concretions formed on serous surfaces, although at first amorphous, ultimately become organised. As the origin of true hydatids is susceptible of the same explanation as that of the *Vesicular and other Parasitic* Worms, the reader is referred to what is advanced on this subject in the article Worms.

23. V. Symptoms.—The formation of hydatids being attended by no appreciable lesion of function or of vascular action, the general symptoms are most uncertain, if, indeed, they be not entirely unascertained, especially in the early stages of this malady. Hydatids are developed so slowly and so entirely without vascular determination and excited action, that the organs in which they are seated adapt themselves to the pressure or slight displacement of parts they may occasion. When, however, they are seated within the cranium, or when their bulk in other situations becomes great, then the disorder they may occasion is made more manifest; although, even then, the constitution may not sympathise very remarkably with the local alteration. It very frequently happens, that no idea has been entertained of the existence of these productions, in persons who have laboured long under slight ailments, until detected accidentally in a *post mortem* inspection. It is only when the hydatidic cyst has acquired a volume so considerable, as to give rise to a palpable or visible tumour, that we can suspect its nature. In such cases, the suspicion is rendered more probable, when some degree of fluctuation, attended with a tremulous sensation, is perceived. This symptom, however, is illusory; for it attends other deep-seated collections of fluid. When, owing to the death of the hydatids, or to inflammatory irritation, or rupture of the containing cyst, suppuration affects this latter, then hectic fever, discolouration of the general surface, emaciation, and other attendants of organic lesion, take place. It sometimes happens that inflammation extends from the cyst to the adjoining parts, and that the morbid production thus makes its way either to the surface of the body, or into some internal cavity or canal. When it opens exteriorly, the nature of the malady then becomes manifest, and the recovery of the patient even possible.

24. VI. Treatment.—Our imperfect knowledge of the causes and symptoms of hydatids necessarily renders the prevention and cure of them also very imperfect. Such of the causes as seem to be more fully ascertained, should be avoided, and those general principles of treatment, found to be most successful when the human body is the seat of parasitic productions, should be adopted. I have shown, in the article Worms, that the chief principle of cure, next to the discharge of the parasitic animals, is to impart tone and vigour to the constitution, so as to enable it to resist their reproduction or increase, and to throw them off with the secretions and excretions, when a more immediate and direct removal of them cannot be effected. We may consider as axioms in pathology and therapeutics, that parasites form, multiply, and increase, in proportion as the parent becomes weakened, and as the secretions and excretions accumulate, or are retained; and that they diminish, and ultimately disappear, with the full restoration of the vital power, and of the secreting and excreting functions of the animal which produced them. The practical application of these axioms to hydatids is very manifest. The principle being admitted, the selection of individual means will depend upon the seat of these productions, and upon the peculiarities of individual cases. In most instances, however, the preparations of iron, those of iodine, the iodide of iron, chalybeate mineral waters, camphor, and the balsams, the various vegetable and mineral tonics, and the promotion of the secretions and excretions, by a combination of mild purgatives with stomachics and bitters, will be appropriate.

25. With respect to the propriety of *puncturing* the hydatidic cyst, in circumstances appearing to require this measure, much will depend upon its seat, with respect to the external surface, to serous membranes, and to internal canals. For, where this operation is likely to risk effusion into an adjoining serous cavity, as into the peritoneum, or to induce inflammation of a serous membrane, it ought not to be attempted. When the cyst is seated near, or has reached, the exterior surface; when inflammation and adhesion have obliterated any cavity intervening between it and the exterior; and when the integuments have become inflamed and acuminated, so as to point out the situation where only a puncture should be made, then it may be undertaken. As to the other points of treatment, they will come under consideration in the places where hydatids, seated in the internal viscera, are discussed.

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HYPERTROPHY.—Syn. *Hypertrophia*, (from ὑπερ, above, and τροφὴ, nutrition,) *excessive nutrition*. *Hypertrophie*, Fr. *Die Uebernährung*, Germ. *Enlargement of a tissue or organ from excessive nutrition.*

Classif. — General Pathology. *Morbid Structures, General Therapeutics.*

1. *Hypertrophy* is a term introduced by French pathologists to signify excessive nutrition of a tissue or organ, and often very loosely employed by them, and by some recent English writers, whose imitation of the former has been more close than judicious. According to the derivation and definition of the word, hypertrophy should be applied only to an increase of nutrition of a tissue beyond what is natural, and not to the augmented bulk arising from adventitious depositions in areolar or other structures. To this latter, however, it has been frequenly applied by some recent authors. M. Cruveilhier has suggested a division of hypertrophy into the *physiological* and *pathological*; but the one variety frequently passes into the other, or the only difference between the two may be that of locality. All the pathological facts, he adds, relative to hypertrophy, may be referred to the three following heads: *first, simple and pure hypertrophy*; *secondly, hypertrophy with induration*; and *thirdly, hypertrophy with transformation.* But, as M. Andral justly remarks, the term hypertrophy should be applied exclusively to those cases in which the tissue, whose volume is increased, retains its natural structure and organisation. Hypertrophy, thus restricted, may exist in any one of the various elementary tissues, or even contemporaneously in two or more of them. It may also occur in organs formed by the combination of several of these tissues, and there affect only one, or extend itself to two or more. In either of these states, hypertrophy may be considered as a simple lesion, although it may be attended by increased firmness and density, which are generally observed to exist in hypertrophied tissues. It more frequently, however, occurs in complicated states, or associated with some transformation of, or deposition in, collatitious or adjoining textures. In such cases it is difficult to determine whether the hypertrophy, or its associated alteration, is the primary lesion, or how far the one may be dependent upon the other. In many instances of hypertrophy of one tissue, the collatitious tissues are more or less atrophied; in this case the sequence and dependence of change are manifest. From these considerations, hypertrophy may be divided into, 1st, the *simple*, and, 2dly, the *associated* or *complicated*; the latter, however, being so diversified as to preclude a description sufficiently brief and consistent for this article. The subject, however, under both these heads is sufficiently discussed in the articles devoted to the pathological anatomy of the individual tissues and organs.

2. I. Nature of Hypertrophy.—When this change occurs simply, without any associated alteration, it can be referred only to an excess of nutritive function; and an active state of the circulation, dependent upon increased nervous power, may be considered as the conditions requisite to this ex-

cessive state of nutrition. This fact is proved by the physiological consideration of the subject, especially by those employments in which particular muscles are principally exercised and consequently developed. In these instances, volition determines a more frequent and energetic contraction of certain muscles, and such contractions require an increased supply of blood: whence, ultimately, results augmented developement. What is familiarly demonstrated in the voluntary muscles also takes place in the involuntary, under analogous circumstances; thus, the constant or repeated efforts made by the ventricles of the heart, by the parietes of the stomach, by the urinary bladder, or even by the intestinal canal, to overcome an obstacle placed at their outlets, or to procure a free passage for their contents, are followed by excessive developement of their muscular structures, and are attended by a relative increase of their vascularity. In these instances, the first change in the hypertrophied part is manifestly excited or increased organic nervous influence. This determines not only excessive muscular contraction, but also augmented vascular determination, and, as the general result, superabundant nutrition. On this point, the opinion of Dr. Carswell, who has written with more precision on this subject than any of his contemporaries, does not materially differ from my own. He fully admits that an increased supply of blood is necessary to hypertrophy, but has left out of consideration the share which the nervous power has in the production both of this increase, and of the excessive nutrition which follows. He justly remarks, that the nature of hypertrophy merits due consideration, as involving the principle on which the treatment of it should be founded, and as establishing a law directly opposed to the doctrine that this lesion is the primary element of certain adventitious structures. M. Andral has proposed this doctrine, and has contended, that hypertrophy of the cellular tissue forms a necessary condition in the production of scirrhus and carcinoma. But, although the cellular tissue may be more or less hypertrophied in these maladies, this alteration is associated with others less physiological, and infinitely more morbid than it, in their vital and organic relations.

3. II. Causes and Origin.—Hypertrophy, in some of its forms, or with reference to certain tissues, may depend upon a predisposition existing in the organisation. Some persons have an hereditary predisposition to an excessive developement of the adipose tissue; obesity occurring in these, however abstemious they may be. Others present also an hereditary predisposition to enlargement of the bones, or of the lymphatic, or other glands. The common *exciting causes* of hypertrophy are,—*first*, the increased action of a tissue or organ; *secondly*, the prolonged influence of an irritant or stimulus. Either of these classes of causes may induce hypertrophy, in its *simple* or *complicated* forms.

4. *A. Increased action or function* of a part gives rise most frequently to hypertrophy in its *simple form*. It then may be considered as purely *physiological;* thus, the blacksmith has the muscles of his arms powerfully developed, and the opera-dancer, those of his lower extremities. The hypertrophy in such cases is frequently attended by an atrophy of other muscles, not brought into action. The drayman, or coalheaver, has the muscles of the arms and trunk strongly formed, whilst those of the legs are imperfectly developed, their action being confined, or entirely suppressed, by the thick-soled shoes they are accustomed to wear, and by their shuffling gait. Increased function, or action of the heart, is often followed by excessive nutrition, even independently of lesion of the orifices and valves. Obliteration of an arterial, or venous trunk, causes enlargement of the collateral vessels. Destruction of one kidney, or of one lung, gives rise to marked augmentation of the size of the other. Obstacles to the evacuation of the contents of the hollow viscera occasion hypertrophy of the parietes of these viscera, owing to the increased action required to overcome these obstacles; but the increased action in such cases operates similarly to that produced by excited function, in the circumstances just adverted to.

5. *B. The protracted operation of a morbid stimulus, or irritant*, is the most common cause of these forms of hypertrophy, which may be denominated *pathological*, and which are most frequently *complicated*. These forms were arranged by Dupuytren under the denomination of *nutritive irritations*. They are not always instances of pure hypertrophy; but, as they often result from a state of chronic inflammation, so they are attended with, and even partially dependent upon, a deposition of coagulable lymph, which has become more or less organised and identified with the tissues in the areolæ of which it has been effused. There is every reason to believe, that many of the cases of hypertrophy said to have been observed in the cellular, serous, mucous, and glandular structures, either singly or complicated with other lesions, were actually referrible to this category. Indeed, it is by no means easy to distinguish the enlargement caused by the effusion of lymph, which has become thus organised from pure hypertrophy, particularly as respects the tissues just enumerated, and when other organic lesions are also present in the affected part. That, however, hypertrophy actually takes place from prolonged irritation, is proved by the changes produced by this cause in the integuments, the mucous, and serous surfaces, the cellular tissue, &c. Most of the forms of associated or complicated hypertrophy, noticed in the articles on the pathological anatomy of the different tissues and organs, are referrible to causes which fall under this head.

6. III. Characters.—*a.* Increase of *bulk* is not always characteristic of hypertrophy; for hollow viscera, as the heart, stomach, urinary bladder, &c., may have their parietes very much thickened, without their dimensions being externally augmented. Hypertrophy may exist even although the apparent bulk of the organ is diminished. In such instances the thickness of the parietes must be considered with reference to the external dimensions and internal capacity of the organ.—*b.* The *form* also of a tissue or part will also be changed or modified in some degree, but chiefly when the hypertrophy is circumscribed. This is demonstrated most remarkably in cases of hypertrophy of the bones, skin, mucous tissues, &c. — *c.* The *consistence* of the hypertrophied part is generally somewhat altered. It is most commonly more or less increased, particularly in the cellular tissue,

lymphatic glands, brain, skin, &c. Diminished consistence is never met with, excepting in some rare instances of complicated hypertrophy, when the enlarged tissue has experienced consecutive change.—*d.* As increased size, and generally also augmented density, or firmness of the hypertrophied tissue, obtain, it must necessarily follow that the *weight* of the part is also greater.—*e.* The *colour* is increased, unless the blood-vessels are compressed by the enlarged structure; as sometimes observed in the brain, in the bones, and cellular tissue.

7. IV. The EFFECTS of hypertrophy are — 1. Increased action relatively to the augmentation of size, as in hypertrophy of the heart, of the urinary bladder, &c. 2. Compression and atrophy of the collatitious textures, particularly when one or more of the tissues of an organ or part is enlarged. 3. Diminution of a cavity, or of the canal of an organ, as in concentric hypertrophy of the ventricles, and in some instances of hypertrophy of the urinary bladder, or of portions of the digestive tube. 4. Compression of adjoining organs, when a viscus is greatly enlarged; and, 5. Augmented developement of the vascular system of the hypertrophied part.

8. V. The GENERAL TREATMENT of hypertrophy may be conducted with the following *intentions*: — 1. The removal of the exciting and pathological causes, when this can be attempted. 2. The diminution of the quantity and richness of the blood, by depletions and low diet, as far as may be consistent with the circumstances of particular cases, and localities of this lesion. 3. The prevention of local determination of blood, particularly to the hypertrophied organ or part, and the derivation of it to other situations. 4. The avoidance of local and general excitement, and the procuring, as much as possible, the repose of the affected organ. All these intentions are not equally applicable to every case, and some of them should be entertained with caution in certain circumstances. Thus, when hypertrophy depends upon repeated efforts to evacuate fully an organ, the second indication ought to be either very cautiously or very partially fulfilled. The particular means or remedies which may be selected to accomplish these intentionsshould depend entirely upon the seat of the lesion, and the peculiarities of individual cases; they are fully noticed in the places where the particular forms of hypertrophy are discussed.

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HYPOCHONDRIASIS.

HYPOCHONDRIASIS. — SYN. Ὑποχονδριον, the Hypochondre; ὑποχονδριακος, adj. (from ὑπὸ, under, and χονδρος, cartilage.) *Hypochondria*, Auct. Lat. *Morbus Flatuosus*, Diocles and Aëtius. *Malum Hypochondriacum*, Galen, Hoffmann. *Morbus Hypochondriacus*, Fracastori. *Morbus Resiccatorius*; *Morbus Ructuosus*; *Passio* vel *Affectio*, vel *Melancholia*, *Hypochondriaca*, Auct. var. *Mater Scorbuti*, de Barbette. *Hypochondriasis*, Sauvages, Linnæus, Cullen. *Hallucinatio Hypochondriasis*, Crichton. *Alusio Hypochondriasis*, Good. *Dyspepsia Hypochondriasis*, Young; *Hypochondrie Maladie Imaginaire*, Fr. *Die Hypochondrie, Grillenkrankheit*, Germ. *Ipochrondia*, Ital. *Neuropathy*, I. M. Gully. *Hypochondrism, Hyp. Vapours, Hypochondriasis, Low Spirits, Hypochondriac Passion, Nervousness.*

CLASSIF. — 2. *Class*, Nervous Diseases; 2. *Order*, from want of vital power (*Cullen*).
4. *Class*, Diseases of the Nervous Function; 1. *Order*, Affecting the Intellect (*Good*).
I. CLASS, IV. ORDER (*Author*, in *Preface*).

1. DEFIN.—*Chronic indigestion with langour, flatulency, dejection of mind and fear, arising from inadequate causes; general exaltation of sensibility; a rapid succession of morbid phenomena, simulating numerous diseases, or otherwise a real, but variable state of suffering, exaggerated by the morbid sensibility and fears of the patient, with unsteadiness or variability of purpose, and distressing anxiety respecting his complaints.*

2. *Hypochondriasis* has been very differently arranged by nosological writers. VOGEL placed it amongst spasmodic diseases, and CULLEN, much more correctly, in that order of nervous complaints which depend upon defective vital power. SAUVAGES, LINNÆUS, PINEL, and GOOD have included it in the class of mental affections, and viewed it as nearly allied to insanity. I agree with Dr. PRICHARD in considering the arrangement of these latter writers not to be justified by the history of the disease, and for reasons that will be stated under the head of *Diagnosis*.

3. I. DESCRIPTION and HISTORY. — *A.* The *first*, or *slightest degree*, or *stage* of this malady, is generally confined to disorder of the digestive organs; its invasion and progress being commonly slow. However, in a very few instances, its attack is sudden, and its course more rapid. The disorder of the digestive organs is always real, although more or less exaggerated, and attended by a sentiment of general uneasiness or distress, referrible to an increased susceptibility, or morbid sensibility, especially of the organic nervous system. The appetite is sometimes not affected, but it is occasionally variable or deficient, or even excessive. Digestion is slow and difficult, and the patient complains of pain, oppression, or distention in the stomach, or hypochondres after a meal. These sensations are attended and aggravated by flatulency, and borborygmi, and sometimes by acid or acrid eructations. Occasionally the abdomen feels hard from flatulent distension, and various symptoms characteristic of chronic indigestion, as cardialgia, sense of heat in the course of the œsophagus, nausea, hemicrania, twisting or griping pains in the abdomen, &c., are complained of. In a few instances, the appetite is perverted, particularly in hypochondriacal females, or during pregnancy, a morbid desire for indigestible or the most improper substances being present. Thirst is seldom much complained of. The tongue is commonly loaded or covered, towards the root and middle especially, and particularly before breakfast, with a mucous coating. The mouth is clammy, and the taste somewhat perverted. The breath is generally offensive. The nausea is sometimes attended with a vomiting of mucous fluid, or of an acid

matter, with half digested food, and sometimes with a sort of salivation. The flatulence of the digestive canal excites, or is accompanied by, sympathetic pains in various situations, which are alleviated by eructations, and especially by the expulsion of the air downwards, but these pains usually return, although not always in the same place, or with the same characters. The bowels are generally costive, but they are occasionally irregular; constipation, with colicky pains, sometimes alternating with diarrhœa. The relaxation of the bowels seldom affords relief; and when it is prolonged, it often increases the anxiety, depression, and nervousness of the patient. The urine is occasionally natural, but it has frequently been observed by Sydenham, Hoffmann, and Cheyne, more than usually limpid and abundant. It is sometimes loaded, or deposits a copious sediment, as in dyspeptic cases. Palpitations in the heart, and in the epigastric region, are sometimes felt, and excite great uneasiness in the patient's mind.

4. *B.* The *second degree*, or *stage* of the complaint, is even still more diversified than the preceding. The symptoms already detailed continue undiminished, are often aggravated, and are accompanied by others, referrible to the brain and organs of sense, and sometimes also to the thoracic viscera. Yet, notwithstanding the severe train of symptoms, and distressing feelings of the patient, he frequently presents the appearance of sound, or even robust health. He often complains of violent pains in the temples, forehead, or occiput, or of general headache, with dimness of sight, and noises in the ears; or of a sense of weight or pressure, more intolerable than pain, at the vertex, with giddiness or confusion of mind; and sometimes of a constriction, or tightness in the head or temples, or of a morbid sensibility of the scalp, and roots of the hair. Occasionally the senses are morbidly acute and intolerant of light and noise. Pains resembling rheumatism, or those of syphilis, are felt in various situations, occasionally with a feeling of burning or heat, and sometimes with coldness, horripilations, numbness, cramps, feebleness, or threatened paralysis of one or other of the extremities. Weakness of the limbs, unsteadiness in walking, or feebleness of the joints, (in some instances, with neuralgic pains,) and great susceptibility to cold and heat, are not unfrequently also complained of. The morbid sensibility of the hypochondriac is generally increased by a cold and humid state of the atmosphere, by easterly winds, and by very warm seasons. His mind is incapable of exertion or prolonged attention, although, when aroused, he may be lively and acute; but he soon becomes engaged with his own feelings and sufferings. To these he frequently recurs in conversation, whenever he has an opportunity of doing so, although he seems to suspect that the subject is unpleasant to those who listen to him, and therefore suppresses a part of his complainings. In some cases there is dyspnœa, constriction of the chest, with a dry, short, or spasmodic cough, and occasionally a sense of suffocation or constriction is felt in the throat, with flatulence and various other symptoms resembling those attendant on hysteria. These phenomena have induced several writers to consider the disease closely allied to hysteria, and the severe palpitations, or irregular action of the heart, frequently also complained of, have further countenanced the idea; whilst they have excited the anxiety of the patient, and induced him to believe himself the subject of irremediable disease of the heart. Sleep is sometimes not materially disturbed, and occasionally the hour of repose is ardently looked for; but, in other cases, it is dreaded as aggravating the distress. Generally, as the disease advances, unquiet and distressing dreams, restlessness or insomnia, incubus and nervous agitations, are more or less complained of.

5. *C.* The *third or confirmed grade* of this malady presents nearly the same phenomena as have been detailed, but in a somewhat heightened and chronic form. The complaints of the patient have been varied, and a succession of most of those enumerated has been experienced. The patient is often tortured with the most distressing feelings, which are greatly aggravated by his fears. He dreads impending dissolution, from the symptoms referred to the head, heart, or chest. His ideas are concentrated on himself and his feelings, and he is incapable of attention or mental exertion, unless aroused by circumstances of unusual interest or moment. This mental incapacity is increased by an idea that his faculties are impaired, and by his dread to exert them. Occasionally vertigo, dimness of vision, or intolerance of light and noise, are so great as to justify his fears; and the pains in the head, or the sensations of pressure on the head and temples, are so severe, that the eyes feel as if starting from their sockets. At the same time, the organic sensibility of the digestive canal is so acute, that the progress and operation of a dose of medicine are traced by him through the different compartments, and made objects of comment. Palpitation is felt at the epigastrium, and about the cœliac axis, and is sometimes attended with sensations of throbbing, extending to the extremities. Disorder of the digestive functions still continues more or less marked, and the tongue is either loaded, or covered with a mucous coating, or is flabby at its edges. The pulse is seldom very materially affected, unless the patient be subject to palpitations, or irregular action of the heart. In this advanced, or prolonged state of the disease, the countenance of the patient often presents an air of distress or suffering. In some cases, it becomes sallow; but, in others, his appearance has no relation to the intensity of the sufferings he expresses. Whilst most of the faculties of the mind are more or less weakened, the imagination is morbidly active, and is constantly engaged with the consequences or results of the disease, of which he believes himself the subject. His desire and hopes of recovery, however, prevent him from being weary of life, or from entertaining an idea of terminating it. On the contrary, he is most anxious to obtain relief; but is frequently unsteady in the use of means calculated to afford it. He has recourse to a variety of opinions; and is more ready to adopt what is recommended for his restoration, than to persevere in its employment, or to continue under the direction of the physician whom he has consulted.

6. II. Associations or Complications. — Judicious observers, who have studied the course of this malady, will agree in believing, that the symptoms characterising it are by no means imaginary. They evidently depend upon physi-

cal disease, in connection with a morbidly exalted state of sensibility. This physical disease commences in the digestive organs, attended with morbid organic sensibility, which extends to the cerebro-spinal nervous system, thereby aggravating and multiplying the morbid phenomena. The lesions, therefore, observed in the course of the malady, whether functional or structural, can hardly be denominated complications. They are rather integral or necessary parts of the malady, rendered more prominent, however, by the distressing feelings which they excite, or with which they are associated. In addition to the functional disorder of the *stomach*, and other chylopoietic viscera, characterising this complaint, the digestive canal often presents evidence of marked irritation, amounting, in some cases, to asthenic inflammatory action, or even to structural lesion of the mucous surface. The secreting function of the *liver* is also often disordered, and symptoms of congestion or engorgement of this organ, or even of inflammatory action, may occasionally be detected; and in these affections, the *gall-bladder* and *ducts* not unfrequently participate. The *spleen* is sometimes enlarged, and occasionally in connection with disorder in the biliary apparatus. Hypochondriacs often are subject to *hæmorrhoids*, owing to local or general plethora, or to costiveness, or to the use of irritating cathartics. This connection has been noticed by HIPPOCRATES, GALEN, STAHL, HOFFMANN, ALBERTI, HIGHMORE, and others, and has been considered as being salutary in plethoric hypochondriacs, and when the hæmorrhoidal flux has not been excessive or debilitating. Some writers, particularly KOCH and BÜCHNER, have viewed the hæmorrhoids as the cause of the hypochondriasis; and I have met with cases which countenance the opinion, as well as with others which militate against it, and show that the removal of the former has increased the latter, by augmenting plethora, and disposing to affections of the brain. I was very recently consulted by a gentleman, who had been subject to hæmorrhoids and hypochondriasis, in its slighter form, the discharge from the former always relieving the latter for a time. The hæmorrhoidal affection was cured by surgical treatment; but the hypochondriasis was afterwards remarkably aggravated, and was followed by painful spasm and irritation about the sphincter. He consulted another eminent surgeon, who divided the sphincter; but the operation was succeeded by inflammation of the rectum, extending along the colon, with the usual dysenteric symptoms, fever, and the utmost distress. These having been subdued, the complaint in the rectum continued unmitigated; and the patient's hypochondriacal sufferings increased to the utmost. In this case, the local treatment, which was obviously injudicious, remarkably aggravated the disease.

7. Hypochondriasis either seldom occurs in FEMALES, or occurs only in a slight degree, as long as the catamenia continue regular; but when they are suppressed or diminished, or disappear at the natural period, it occasionally commences, or is aggravated. It may also occur in a slight form during *pregnancy*, and subside or disappear after delivery. Of this I have seen more than one instance. Pregnancy may also relieve this complaint, when the patient has been labouring under it for some time previously. *Organic disease*, or *irritation* of the *uterus*, is one of the most frequent associations of hypochondriasis in this class of patients; and it may, moreover, not be the only one in the same case.

8. The symptoms referrible to the *head* are not always dependent alone upon altered or exalted sensibility. In addition to this state, there is often also congestion, or deranged circulation in the brain; but the cerebral affection is generally consecutive upon disorder of the digestive functions, and upon increased sensibility of the organic or ganglial nervous system, even although the chief cause of the hypochondriasis has acted primarily upon the mind.

9. Hypochondriasis may be excited in the course of some organic malady, by the patient's attention being suddenly directed to the seat of disease, although his feelings and spirits had not been previously affected. This is not unusually the case with *organic affections* of the *heart*. I have seen more than one instance, where the detection of disease about the valves, or a particular examination of the heart by auscultation and percussion, led the patient to suspect what really existed; and the suspicion soon amounted in his mind to certainty,—his fears and distresses becoming even painful to the observer. The connection of hypochondriasis with the *gouty diathesis* has seldom been adverted to by writers. Yet I have met with several cases where the former has come on after the suppression or disappearance of gout. In such cases, disorder of the abdominal viscera is more or less marked; and is sometimes associated with deranged circulation in the brain. Indeed, this may be said to be one of the forms of misplaced gout: hypochondriasis, when prolonged or neglected, or aggravated by injudicious treatment, may pass into *melancholy*, or even into *insanity*; but this is much more rare than is supposed. In these instances, melancholic ideas, or some single delusion, is entertained, whilst the primary disorder either continues unchanged, or is partially absorbed in the superinduced malady.

10. III. DURATION AND TERMINATIONS.—*a.* The *duration* and *progress* of hypochondriasis are most indefinite. The accession of it is generally gradual and imperceptible, unless when caused by some overpowering impression or mental emotion. When judiciously treated, in its slighter forms, or during early periods, this complaint may be removed after a comparatively short time; but, otherwise, it may continue for years, with various mutations, and with indefinite periods of relief or exacerbation, depending partly upon the permanence of the causes, on the state of the season, or the occupations and amusements of the patient, or upon whatever may affect his general health and constitutional powers. It may even spontaneously cease for a time, and return again and again; or it may continue through life, without apparently shortening its duration: but, more frequently, the functional, or structural, lesion producing it gradually increases, until visceral disease of a very obvious kind is developed, and shortens existence, under the care of some practitioner who, most probably, had not witnessed the earlier progress of the malady.

11. *b.* The *terminations* of hypochondriasis are —1st, in the restoration of health by medical treatment;—2dly, by critical evacuations and spontaneous recovery;—3dly, in the develope-

ment or supervention of organic or fatal visceral disease. *a.* The *first* of these can be accomplished only slowly, and by judicious recourse to medicine, regimen, and moral discipline. *b.* *Critical evacuations* are rarely observed. *Diarrhœa*, particularly when caused by a copious secretion of bile, and followed by a resolution of hepatic engorgement or biliary obstruction, occasionally affords some relief; but it rarely removes the complaint, unless it be aided by additional means. The same remark applies equally to *hæmorrhagic discharges.* They furnish, however, indications of what should constitute, at least, a portion of the treatment in many cases. The spontaneous appearance of *cutaneous eruptions* has been noticed by BOERHAAVE, LORRY, VAN SWIETEN, HEIM, and REIL, as favourable occurrences; and enlargement of the external glands had also been considered critical by STOLL, KLEIN, and others.

12. *c. Organic, or fatal visceral disease,* is more liable to occur in hypochondriacs than in other persons, or than is commonly supposed. The parts most frequently undergoing structural lesion are the stomach, liver, and biliary apparatus, the brain and membranes, the large bowels, the heart and large vessels, the spleen, pancreas, uterus, and kidneys. Functional disorder of some one of these, in connection with derangement of its circulation, and with exalted organic sensibility and nervous susceptibility, most probably gives origin to most of the patient's sufferings; and as these disorders proceed onwards to organic lesion, the malady advances, until this lesion is expressed by signs, much less equivocal than those attending the earlier stages of the hypochondriacal affection. Insane delusions, melancholy, palsy, or epilepsy, may thus supervene from progressive structural change; but the former of these are by no means so common as generally believed. Palsy is a not frequent, and epilepsy is a comparatively rare, termination of this malady. Organic lesions of the heart and pericardium, as well as of the large bowels and urinary organs, are, however, oftener observed than has been supposed. The structural changes, met with in advanced or old cases of hypochondriasis, are chiefly the following.

13. IV. LESIONS OF STRUCTURE. — Various changes have been observed in the *digestive mucous surface*, the most important of which have been congestion, partial softening, discoloured spots, and slight ecchymoses. Thickening of the coats and induration, or an incipient state of schirrus of the pylorus, or cardiac orifice of the *stomach*, (BONET, &c.) have been more rarely met with. The *liver* has presented various lesions, the chief of which have been congestion, enlargement of the organ, and dilatation and engorgement of the vena portæ (LIEUTAUD). I have found the *hepatic ducts* and *gall bladder* distended, enlarged, and filled with dark inspissated bile. Gall stones have also been found in the bladder and ducts. Alterations of the *spleen* have been observed by BONET and others, and of the *pancreas* by BRANDIS. The *large bowels*, especially the sigmoid flexure of the *colon*, the *cæcum* and *rectum*, frequently present changes similar to those noticed with reference to the digestive mucous surface generally, or are thickened, or somewhat contracted; and the colour is sometimes displaced. Hæmorrhoidal tumours are often met with. A plethoric, engorged, or congested state of the abdominal viscera generally, has been remarked by THEDEN, BURGGRAU, and LEUTHNER. I have found calculi in the *kidneys* in one instance, and enlargement of the prostate gland and disease of the *bladder* in another. Alterations of the *uterus* have been noticed by some writers; and I believe that they are not rare in connection with hypochondriasis, especially after the change of life.

14. Organic disease of the *heart* and *large blood-vessels* is not unfrequent in hypochondriacs; but instances in which the structure and orifices and valves of this organ have been accurately examined after their death are remarkably rare. It is not improbable that some of the changes observed as a consequence of internal carditis, and of chronic inflammation of the large vessels, would be detected in some cases, if a careful inspection after death were instituted in persons who had been subject to this complaint. A plethoric state of the vascular system generally has been remarked by WINNEKE, and a very dark and altered state of the *blood*, by THILENIUS and BURGGRAU. Various lesions have been found in the *brain* and its *membranes*, particularly in cases wherein the patient's chief suffering had been referred to the head; but these lesions have either been very different, in different cases, or very imperfectly described; whilst, in some, little or no alteration has been detected. In short, the bodies of hypochondriacs have presented lesions as diversified as the complaints made during life; but these lesions have been very frequently overlooked, or no inquiry after them has been made, owing to the circumstance of the complaints of this class of patients having been very generally viewed as entirely imaginative.

15. V. DIAGNOSIS. — The diagnosis of hypochondriasis is most difficult; for the complaints of the patient are so distressing, and his sufferings apparently so extreme, that the inexperienced practitioner may be deceived by them, and believe them to proceed from dangerous states of disease, and to require the most energetic remedies. This simulation of organic and serious maladies, if it be not detected, may lead to a mischievous treatment. On the other hand, when a patient is known to be the subject of hypochondriasis, the circumstance ought not to induce us to overlook, or to treat carelessly, his sufferings, which are generally not only real, but also often depending upon structural changes, although these changes are either too obscure or too minute to be readily or easily detected. The versatility and mutations of the hypochondriac's sufferings, and the inconsistency observable between his complaints and his appearance, and between the local and general, or constitutional symptoms, will readily suggest the nature of the disease. Yet the symptoms sometimes continue without change; and the patient often makes the same complaint. In such cases, there is reason to believe that real disease exists, although exaggerated by his morbid sensibility and fears, by his imagination having long been engaged with his sensations in the seat of disorder. The want of relation between his feelings and constitutional symptoms ought also not to be too much relied upon; for, in hypochondriacs, the vascular system is not readily excited to febrile commotion, although the sensi-

bility is easily deranged and altered in a variety of situations, either successively or simultaneously. In every instance, there is the utmost necessity for patient investigation, and for the exertion of practical acumen. When the hypochondriac's sufferings are seated in the digestive organs, then a careful examination of the abdominal regions, and of the excretions, will generally indicate the extent of mischief, and show how much may be attributed to the patient's susceptibility or morbid sensibility; but when the complaints are referred to the head or heart, then the difficulty is greater; for we know that in these situations, structural changes may be slowly advancing, without inducing those physical signs and disorders of the functions of these organs, usually attendant upon more rapidly developed organic lesions.

16. The sufferings referred to the *digestive organs* have been imputed by BROUSSAIS and his followers to *gastro-enteritis;* and I believe that, in many cases, the circulation in the digestive mucous surface is more or less deranged: but this derangement is not identical with true inflammatory action. The organic sensibility and state of nervous influence in these parts are not the same in these complaints. In hypochondriasis, the patient can bear firm and prolonged pressure, although he may wince from a momentary or slight pressure, owing to his fears and morbid feelings. He generally has an unimpaired, or even a ravenous, appetite; is capable of using exercise, or even of undergoing fatigue, and is benefited by them. His bowels are usually costive, and his appearance is not materially, if at all, affected; and febrile symptoms are not observed. Whereas, in gastro-enteritis, firm pressure is generally not endured, the appetite is impaired, as well as the looks, strength, flesh and general health; and the bowels are loose and irritable, alalthough the converse of this is sometimes observed. The spongy condition of the gums, the falling of them from the teeth, and the flabby state of the sides of the tongue, frequently observed in hypochondriasis, indicate rather a deficiency of tone and of vital cohesion of the digestive mucous surface, than inflammatory action.

17. The symptoms referrible to the *head* are often such as to rouse the anxiety of the practitioner, especially when they are attended by disorder of any of the functions of sense. Yet I believe that these symptoms more frequently depend upon disordered circulation, as well as altered sensibility, than is supposed. In this complaint, the state of the cerebral circulation is too often neglected, or not inquired into; and the sufferings of the patient believed to be either exaggerated or imagined. When his strength and healthy appearance are unimpaired, and the functions of the senses are uninjured; and when the temperature of the scalp and the action of the carotids are not materially affected, we may safely conclude, that the morbid feelings in the head do not indicate that danger, which the fears of the patient would imply; and this inference will be the more conclusive, if the patient have never experienced any apoplectic, paralytic, or epileptic seizure; and if he has been known to be subject to nervousness, low spirits, or hypochondriacal feelings. In many cases, however, of this malady, particularly in the second or third grades of it, increased action of the carotids, heat of the scalp, flushing of the countenance, suffusion of the eyes, &c., indicate cerebral plethora, or active congestion within the head, and sufficiently show that, although the sensations in this quarter may be exaggerated, they are by no means unreal.

18. The disorders referred to the *heart* and *lungs* are to be distinguished from such as are unequivocally organic, by attention to the physical signs. The palpitations and anxiety at the præcordia often complained of, are certainly chiefly nervous in their nature; but of this we have only negative proof. During the palpitation, a bellows-sound may be present, although it cannot be detected in the intervals. Yet I have known instances where it was at first heard only during the paroxysm of palpitation; but, after the lapse of a long period, it was heard more constantly. I believe that those distressing symptoms, although strictly nervous at early periods of the disease, either slowy or imperceptibly induce, or are attended from the beginning with, a slight and gradually increasing kind of organic lesion. Morbid states of the heart, as slow grades of inflammatory irritation, may exist, especially in the lining membrane of the cavities and large vessels, and occasion the distressing feelings complained of, although they may not be manifested by physical signs. When cough, and difficult or oppressed breathing, are present, their nervous or sympathetic nature may be readily determined by attention to their characters, by the absence or the appearance of expectoration, and by the signs furnished by auscultation and percussion.

19. Hypochondriasis has been often confounded with, or viewed as a variety of, *insanity*. It is important to discriminate between them. Dr. PRICHARD's remarks on this subject evince the correct judgment of this able writer. He observes, that an hypochondriac is in full possession of his reason, though his sufferings are not so dangerous, or so severe as he supposes them to be; but if he declares that his head or his nose has become too large to pass through a doorway, or displays any other hallucination, he has become a lunatic; his disorder has changed its nature; and this conversion takes place occasionally, though by no means so frequently as supposed. Hypochondriacs, however low-spirited or dejected, also suffer differently from persons affected with *melancholy*. The apprehensions of the former are confined to their own feelings and bodily health. On other subjects, they converse cheerfully, rationally and justly. But melancholics view all things through a gloomy medium. They despond on all subjects, and are mentally miserable, and independently of any severe bodily suffering. The affections and sentiments of the hypochondriac, especially to his former friends or to his connections, are not in the unnatural, or perverted state, observed in all the forms of insanity.

20. VI. CAUSES. — i. *Predisposing circumstances.* Hypochondriasis may commence at any age; from 21 to 55 in males, and from 30 to 60 in females. It is more frequent and more severe in the former than in the latter sex. It seldom occurs in females until after 30 or 35, hysteria being the form which nervous affections usually assume in them in early life; but it often commences about or soon after the cessation of the menstrual discharge, although rarely in so severe a form as in the other sex. It affects every

temperament or habit of body; but somewhat oftener the nervous, the melancholic, the sanguine and the bilious; and persons who are subject to hæmorrhoids, to constipation of the bowels, and to disorder of the digestive functions, and who are of a sallow complexion. Hereditary influence, or peculiarity of constitution transmitted from the parents, has, perhaps, some influence in predisposing to it, as Willis, Hoffmann, and others have contended, although not in so remarkable a manner as in some other nervous complaints. Employments which are sedentary, or prevent due exercise in the open air, and which, at the same time, admit of activity of mind, also predispose to this complaint. Hence the frequency of hypochondriasis in shoemakers and tailors. Mental exertion and fatigue, or prolonged or overstrained attention and devotion to a particular subject, especially in connection with full living relatively to the exercise taken in the open air, may be said to be the chief sources of predisposition amongst the educated classes. Owing to these circumstances, this has been termed the disorder of literary men; but whoever is engaged in active mental pursuits, or in departments of business requiring great intellectual exertion, or occasioning anxiety of mind, is equally liable to it. Dr. Prichard observes, that agricultural labourers, who spend a great portion of their time in solitary employment in the country, are frequently the subjects of this complaint. Although solitary employment is likely to dispose the mind to brood over the evils that afflict it, yet much is probably also owing to the diet of field labourers, and to the influence of humidity and exhalations from the soil to which they are exposed, particularly in the reparation of ditches and hedges. The effect of climate in predisposing to hypochondriasis is not very manifest; but situations which are humid, and productive of terrestrial emanations, are apparently not without some influence in the production of it.

21. ii. *The exciting causes* may be divided into (*a*) those which act more immediately upon the mind, and consecutively, or through the medium of the mind, upon the organic functions; and (*b*) those which affect primarily those functions, and secondarily the mental energies. — *a.* Whatever exhausts, or directly depresses cerebral power, as intense application of the mind to difficult or abstract subjects, anxieties respecting schemes, speculations, or objects of ambition; disappointments, sorrow, fright, or sudden alarm; the depressing passions, severe losses of fortune or friends, indulgence of sombre or sad feelings; devotion to music and the fine arts, reading medical books, &c., and whatever favours congestion of the brain, as indulgences in bed, the use of narcotics, particularly opium, &c., may occasion this complaint.

22. *b.* The causes which act primarily upon the organic nervous system, and functions of the organic viscera are very diversified. Whatever impairs the energy of the system, as the too frequent or too liberal use of calomel as a purgative, or of other mercurials; poor, or innutritious diet, or the excessive use of tea and slops; a humid, close, impure, or miasmatous air, &c., may produce hypochondriasis. Mercurial purgatives, although often serviceable by promoting the discharge of bile, and giving relief for a time, yet often increase the nervous depression and morbid sensibility, when frequently resorted to, and induce or aggravate this complaint. Of the origin of hypochondriasis in an improper recourse to calomel, I have seen several instances. Whatever inordinately excites, or directly relaxes, the digestive mucous surface, as acrid cathartics, often exhibited, &c.; whatever occasions or perpetuates indigestion, or impedes the functions of secretion and excretion; and whatever occasions plethora of the vascular system generally, or of the portal or cerebral vessels in particular, especially overloading the digestive organs by too large meals, or by too rich or full living, the inordinate use of animal food, of malt liquors, wine, &c.; insufficient exercise, and inattention to the several excreting functions, may give rise to hypochondriasis. Whatever induces torpor, or perpetuates inaction of the depurating organs, whilst the organs of supply are stimulated to increased activity, will occasion redundancy of noxious elements, or of the ultimate products of animalisation, in the blood, and will, sooner or later, especially in connection with vascular plethora, give rise to this complaint, or to some other, depending, equally with it, upon oppletion of the vascular system. Persons who have been accustomed to active occupation, both physical and mental, or to much exercise in the open air, upon retiring from business with a competency, and when hoping to enjoy the fruits of industry, are often overtaken by this complaint, particularly if they live fully, and in a comparative state of ease and indolence. The vascular system, which was formerly preserved in a state of fulness, in due relation to nervous power, by the healthy action the different emunctories, now becomes overloaded, particularly the portal vessels. The cerebral circulation also becomes oppressed, and the mental energy impaired.

23. *c.* Some of the causes act by weakening both the organic nervous influence and the mind. The most injurious of these are premature and excessive sexual indulgences, particularly masturbation. Whenever hypochondriasis appears early in life, this should be dreaded as having been the chief cause. Many of the depressing passions, and anxiety of mind, act in a similar manner. As the early addiction to vicious habits, as well as several others of the exciting causes, is more or less frequent in all classes of the community, it cannot be said that the effect is confined to any particular class. Indeed, hypochondriasis is often met with in the lower orders, although not so frequently as in those whose minds are most highly cultivated, whose sensibilities are thereby rendered acute, and who are either precluded from, or not obliged to take, that exercise which is necessary to prevent general, local, or excrementitious plethora.

24. VII. Pathology. The ancients appear to have observed this complaint chiefly amongst philosophers, poets, and others endowed with the most acute sensibility, and the most vivid imagination; and to have either confounded it with, or viewed it as a variety of, melancholy. Aristotle says, that all the great men of his time were melancholic, that is, hypochondriac. Hippocrates, Aretæus, and others, attribute the complaint to an excess of black bile. Diocles refers it to the stomach, and Galen considers it as a variety of melancholy, having its origin in this

organ. However much the ancients and older writers differ, as to whether it should be considered as a dyspeptic, or as a mental affection, they appear not to view it as connected with hysteria. SYDENHAM, however, describes hypochondriasis and hysteria as the same affection; without taking into account the chronic inflammations, obstructions, or lesions of structure so often associated with the former, and refers them to deficiency or irregularity of the animal spirits, — of the cerebro-spinal nervous influence, in the language of modern pathology. WILLIS considers it as a nervous complaint, seated in the brain; and ZACUTUS LUSITANUS, as an affection of the stomach and liver, depending upon coldness of the former and increased heat of the latter. BOERHAAVE thinks that it depends upon a viscid matter engorging the vessels of the organs seated in the hypochondria, as the liver, the spleen, stomach, pancreas, and the mesentery. STAHL and his followers suppose it to arise from efforts to establish a critical hæmorrhage; LOWER, from a morbid disposition in the mass of blood; and HOFFMANN, from too great a tension of the nervous system, sometimes in connection with inflammation of the digestive mucous membrane. From the time of HOFFMANN until that of CULLEN, various modifications and absurd combinations of the preceding opinions have been advanced. CULLEN observes, that this disorder occurs chiefly in persons of a melancholic temperament; that it consists of an affection of the mind, conjoined with dyspepsia, and is the result of a weak and mobile state of the nervous power. The opinions of CRICHTON and GOOD are deficient in precision and accuracy; they have confounded with hypochondriasis affections entirely distinct from it and from one another. LOUYER-VILLERMAY has formed more correct views of its nature and relations than most modern authors. He concludes that it is seated in the abdominal viscera, particularly in the stomach, and that these are affected in their nervous system or their vital properties, and especially in their organic sensibility. He conceives the disorder to consist in an alteration of the vital properties of the nerves of digestion, and an exalted state of organic sensibility, of which these nerves are the special conductors and receptacles. At the same time, he admits that the general sensibility and the cerebral functions become consecutively affected. This opinion is essentially the same as that of BICHAT; and it has been adopted by the author, and, more recently, by M. BRACHET and Dr. GULLY. M. BROUSSAIS contends that hypochondriasis is not merely a nervous affection, but that it is a result of chronic inflammation of the digestive mucous membrane; the morbid sensibility distinguishing it arising from the peculiar condition of this membrane, as respects its vascularity; and that the various ailments of which the hypochondriac complains proceeds from sympathy with this part of the digestive canal.

25. M. GEORGET argues, on the contrary, that the disease is primarily seated in the brain; that it is characterised by disorder of the functions of this part, unaccompanied by fever, or convulsive motion, or any manifest derangement of reason or judgment, and he adduces the following circumstances in support of his argument. 1. That the chief exciting causes of the disease exert their influence directly on the functions of the brain. 2. That the characteristic symptoms are referrible to the head. 3. That other symptoms observed in the complaint are not constant, some belonging to one organ, and others to another, whilst the digestive functions are occasionally not disordered. 4. That moral treatment is the most efficacious in the complaint.—There are several fallacies in the above inferences: It by no means follows, that, because certain occurrences make their first impression on the mind, the brain should be either principally or primarily affected by them. The depressing passions, however excited, produce a much more remarkable effect upon the functions, and even upon the organisation, of the heart, the stomach, the liver, &c., than upon the brain itself, unless indeed this last organ has previously been in a state of disease. The early symptoms, also, of hypochondriasis, are certainly not so referrible to the brain, as to the digestive and other organs, supplied by the ganglial class of nerves; and moral treatment is not always the most successful, or that which should be alone put in practice: it more generally constitutes only a part of a general plan.

26. Dr. PRICHARD observes that, when we take into consideration the mental dejection of hypochondriacs, the habitual state of their spirits, and the trains of morbid or painful sensations which torment them, we must admit that some deviation from the healthy state of the cerebral functions lies at the foundation of their ailments, though it is remote from organic disease, and of a kind of which we can form no conception. Many of the phenomena, he allows, would lead to the opinion, that the principal deviation from the natural state of functions, is seated in the nervous system of physical or organic life; but, phenomena involving consciousness and affections of mind, can hardly be confined to this part of the nervous system. Dr. PRICHARD, however, overlooks the fact, that the brain itself is as much supplied with the organic nervous system, as any other internal organ, and consequently that it will manifest disorder, whenever this part of the nervous system is seriously affected; and that this disorder will present similar characters as to kind — as to depression, perversion, activity or exaltation — to those displayed by other organs influenced by this system. The complaint, it is admitted, commences, or is first manifested, in the digestive viscera; and, it is not until the organic nervous system evinces great depression throughout the abdominal organs, that the functions of the brain become also manifestly depressed or impaired, and then the depression observed in the energies of these functions is similar in kind to that remarked in the digestive, secreting, and excreting actions; — these latter are performed slowly and imperfectly, — intellectual power, attention and application are also weakened. The sensibility of the organic nervous system, is morbidly acute in all or several of the viscera, — the cerebro-spinal system, and the dependent organs of sense and volition, are also morbidly susceptible, and incapable of the energetic exercise of their functions. The organic actions are performed with obscure sensations of distress, difficulty or anxiety, — the mental operations are attended by fear, distrust, and anxious bodings. The vital manifestations throughout the economy

are languid and relaxed, and the resistance opposed by life to morbid impressions remarkably weakened, — the faculties of the mind are equally languid, and the tone of the cerebro-spinal nervous system altogether depressed. Dr. PRICHARD supposes, that the occasional suspension of the complaint, for longer or shorter intervals of time, militates against the opinion, that the disease is owing to the state of the organic, nervous, and digestive functions; but this part of the nervous system is as likely to experience remissions and exacerbations of disorder as the brain and its dependencies. At the commencement, the affection of the organic or ganglial nervous system is confined chiefly to the digestive and excreting organs; but at a more advanced stage, it is extended to the brain, where it occasions the dejection of spirits, the fears, and the anxieties connected with the patient's feelings and ailments, characterising the fully developed complaint.

27. My views will be partly apparent from what has been now advanced. But, although the organic nervous system is evidently primarily and chiefly affected in hypochondriasis, and although the brain thus becomes consecutively implicated, other morbid conditions are also superinduced, and are more or less concerned in the aggravation or perpetuation of the patient's feelings and sufferings. Imperfect excretion compared with the supply of nourishment induces either absolute or relative plethora, as well as a morbid condition of the circulating fluids, owing to the accumulation of noxious matters — alimentary, saline, and animal — products of animalisation, which have not been eliminated from the blood. The chief vital organs thus become loaded and oppressed; and the nervous system and brain are rendered morbidly susceptible by the quality of the blood circulating in them. From considerable experience and close observation of the circumstances connected with the pathology and treatment of this complaint, I am firmly persuaded that these views constitute the only basis of a successful method of cure.

28. VIII. — PROGNOSIS. It is often extremely difficult to form an opinion, as to the presence of danger in this complaint. Even where the sufferings have been most distressing, the patient's life has apparently not been materially shortened thereby; and where they have been much slighter, death has occurred unexpectedly, and whilst the symptoms did not seem to indicate its approach. This may have been owing in part to the want of discrimination on the part of the practitioner, in not detecting organic lesion in the heart, brain, or other viscera. There can be no doubt, that many cases of obscure structural change in either of these organs, or in any other part, were formerly considered as hypochondriasis, and most injudiciously treated as such. Many of these would have been detected by the improved diagnosis of the present day, and thus the number of instances of the disease would have been diminished. Yet nevertheless, the existence of this complaint, or, in other words, of an affection of the functions and sensibility of the organic, and cerebro-spinal nervous systems, sometimes associated with, and heightened by, structural lesions, cannot be doubted; although M. FOVILLE has contended that it should not be considered as anything else than organic change in persons of acute sensibility; that both it, hysteria, irregular gout, and disorders of the fluids, belong to the same category; and that to one or other of these, the ignorant part of the profession refer those complaints, the true seats and natures of which they are unable to detect, — that, in short, they are names under which all others but the morbid anatomists conceal their ignorance. Now it may be stated without much fear of injustice, that those who see nothing in disease, but what is demonstrable after death, and who believe in nothing pathological, which is not material and palpable, will very often arrive at wrong conclusions, as to the origin, nature, course, and treatment of the most important maladies of our species.

29. The *Prognosis*, however, relates more to the probable recovery of the patient than to any danger more or less immediately attending it. Of the existence of danger, the signs of organic change will be the chief harbingers, and upon the detection of these, and upon the inferences formed as to the seat and nature of existing lesion, the opinion will necessarily depend. — *a*. The circumstances, which may be considered as *unfavourable* to the patient's complete recovery, are not always very manifest or readily ascertained; but, if the causes are not removable, or chiefly of a moral kind, — if the disease is confirmed, or if the patient has had repeated attacks, — if it has supervened upon the suppression of the hæmorrhoidal flux, and is not removed by the restoration of this evacuation, or upon the disappearance of the catamenia at the usual period, — if sleep is not obtained without recourse to narcotics, — if the imagination is powerfully affected, and constantly influenced by moral causes, the physical indications of disease being slight, — if the nervous affection is associated with serious disorder, or with signs of structural change of some important viscus or with some mental delusion, — and if the patient indicates much suffering in his appearance, or the melancholic temperament, or a cachectic habit of body, — we may expect to alleviate, but we can hardly hope to remove, the malady, although the removal of it may be accomplished.

b. A more favourable opinion may be entertained, if the chief ascertained causes are removable; if the disease is recent, or only in the first or second stage; if the patient is of a sanguine temperament; if the circumstances or profession of the patient admit of exercise, or salutary employment of mind or body, and of travelling, or repeated change of air during the treatment; if he enjoys his nightly repose, and possesses his usual or natural looks; if the test of BAGLIVI — "In chronicis morbis si facies naturalis sit, ac boni coloris, nunquam crede adesse obstructiones, aliaque vitia in visceribus" — is applicable, and if the unfavourable circumstances enumerated above are not present. — Hypochondriasis has been removed by the supervention of other diseases, as diarrhœa, dysentery, fever, jaundice, dropsy, &c.

30. IX. — TREATMENT. Hypochondriasis would be more frequently cured, if stricter attention were paid to the removal of the circumstances in which it originated, and to the combination of physical and moral treatment appropriately to the pathological states just considered. But the disease is generally advanced or confirmed, before proper medical advice is resorted to, — the patient has been for some time exciting his imagination,

and aggravating his morbid sensations by reading medical works, which might mystify but could not instruct him as to his ailments, and dabbling in physic, which might confirm, but could rarely relieve, his complaints; — he fails in his own efforts, and then, if he have recourse to a duly qualified adviser, he expects, and is impatient if he does not derive, immediate benefit. Many hypochondriacs also adopt neither the restricted diet, nor the regimen prescribed for them; and thus the treatment fails more from the fault of the patient, than from the means employed.

31. i. *The first indication*, in the treatment of hypochondriasis, is *to remove the remote causes, the habits, circumstances, and moral influences, to which the patient has been, or is subjected.* The *diet* should be restricted, and regulated with reference to the patient's habits, occupations, and daily amount of exercise; and he ought to be engaged, as much as possible, with objects calculated to interest, but not to fatigue, the mind. With the affluent this is a matter of difficulty, and is often only to be accomplished by travelling. In the good old monkish days, pilgrimages to the shrines of saints were recommended for the benefit both of soul and body; but in modern times, since these have become divided cures, saintly interference has been but little confided in, and the purifying operation of mineral springs has alone been considered efficacious. And, certainly, the good effects resulting from faith in either, or in both these agents, have neither been few nor equivocal. The shrewd practitioner, who plants himself by the side of a saline or chalybeate mineral spring, or any other spring possessing deobstruent and tonic properties, and situated in a dry and salubrious air, if he succeed in attracting hypochondriacs to his Hygeian temple, by the usual direct or indirect means, will generally relieve many of the more faithful of his worshippers. The lawyer, the merchant, the stockbroker, and others, who have weakened their digestive organs, exhausted their nervous systems, and over-excited or tortured their brains, by application to business, by the vicissitudes of affairs, and the anxieties which are consequent thereon, when induced to visit a watering place, will frequently derive benefit from the moral and physical changes thereby occasioned. Instead of over-exciting or distracting the mind with business, of overloading, and perhaps over-stimulating the digestive organs, of allowing the liver and bowels to become torpid, of neglecting due exercise in the open air, and of respiring the impure atmosphere of a crowded city or manufacturing town, the hypochondriac is properly directed to relinquish the anxieties of affairs, to conform to a limited diet, to keep his bowels very freely open, to walk and ride a certain number of miles daily at prescribed times, and to drink the waters, whether aperient, deobstruent, or chalybeate. The result cannot be doubtful in many cases. The entire removal of the causes of disorder, the exercise, the change to a purer air — the thorough alteration of habits, of circumstances, and of atmosphere — all combine to produce benefit; and the physician, as well as the spring, obtains a credit, to which the amount of merit really possessed by either by no means entitles them, and which is often heightened by the circumstance of advice previously given to the patient — whilst he is immersed in business and distracted by anxieties, when precluded from exercise and amusement, and when constantly subjected to the combined operation of the causes of the malady — having failed in accomplishing what was probably most judiciously attempted, but which he was counteracting in the most efficient manner in his power.

32. The best means of fulfilling this indication is by *travelling*, and by due *attention to the diet, and to the excreting functions.* Continued residence at a single watering place is not nearly so beneficial as travelling, unless much exercise be daily taken. Travelling, aided by mineral waters suited to the peculiarities of the case, has the best effect; and, next to this plan, judicious medical treatment, pursued at the same time with change of air and scene. The very incidents connected with travelling, as Dr. PRICHARD remarks, abstract the patient's attention from his feelings and sufferings; and, even the temporary disorders that may occur, as rheumatism, cold, and diarrhœa, produce this effect in a still more remarkable manner. When mineral waters are resorted to, either alone, or in connection with travelling, those which are aperient and deobstruent should be first used, as the waters of *Seidschutz*, or *Pullna*, or *Cheltenham*, or *Harrowgate*, &c.; and subsequently those of *Bath*, *Carlsbad*, or *Marienbad*, *Pyrmont*, or *Tunbridge*, &c. The springs of *Schwalbach* and *Pyrmont* were much extolled by HOFFMANN; those of *Eger* and *Marienbad*, by HEISTER and HUFELAND; and the waters of *Pyrmont* and *Seltzer*, by MARCARD. The baths of *Wiesbaden* have also been praised by RITTER and others. During a course of Chalybeate waters, the bowels ought to be kept moderately open, either by aperient medicines, or by the more aperient or purgative waters. Exercise of all kinds is more or less beneficial; but that on horseback, or on foot, or both, is perhaps preferable. The former was much praised by SYDENHAM and FULLER; but, whatever kind of exercise be adopted, it is necessary to regulate the bowels, to promote the functions of the emunctories, to remove the patient from the pursuits, anxieties, and circumstances, which induced the complaint, or to change his habits, and to amuse and interest his mind.

33. ii. *The second indication is to evacuate morbid secretions and accumulated excretions, to correct the morbid states of the digestive canal, and of the organs immediately connected with it, and to relieve the more distressing feelings of the patient.* It is indispensable to the obtaining of the confidence of the patient, and, consequently to the successful management of his case, that his various ailments should be attentively heard and patiently investigated; that they should be altogether viewed as real, and that the treatment should be prescribed for him with clearness and with decision. However much the practitioner may doubt as to the origin or nature of the complaint, and however much he may despair of the efficacy of the means prescribed, he should conceal his doubts, treat the sufferings and feelings of the patient with sympathy, and arrange and combine the means of cure into a method at once consistent and appropriate, which is to be faithfully pursued in all its parts. Confidence will be thus inspired, without which he will neither derive benefit nor continue under treatment.

34. *a.* The propriety of having recourse to *mild* or *stomachic* purgatives, when the bowels are sluggish or torpid, or the stools offensive, cannot be questioned. Yet, in some cases, the *gastro-intestinal mucous surface* may be in such a state of irritation or of chronic inflammation, as to require these to be prescribed with caution, and selected with judgment. When this state of the digestive mucous surface is present, *leeches* should be applied to the abdomen, or to the anus: *refrigerants* should also be given with *mucilaginous* or *emollient medicines*, (F. 355. 431. 436. 821. 837. 865.) and the functions of the skin promoted by the *warm* or *vapour bath*. If the patient be plethoric, a moderate *venesection* or *cupping* on the nape of the neck, or a repetition of leeches to the epigastrium or anus, will be of service. Although irritating purgatives are hurtful in this description of cases, yet those of a mild or of a cooling kind ought not to be withheld; and their operation may be promoted by enemata. The tartrate or sulphate of potash, the carbonate of soda or magnesia with rhubarb, either in powder or infusion; or the phosphate of soda, or the tartrate of potash and soda, may be given with other substances, (F. 440, 441. 868.) according to the peculiarities of the case. The *diet* should be restricted chiefly to mucilaginous or farinaceous articles, and the beverages consist of simple saline or cooling fluids.

35. In other cases, particularly where the digestive mucous surface is deficient in tone, and when the states of the epigastrium, of the pulse, and of the tongue do not indicate inflammatory irritation, *purgatives* or *aperients* of a warmer or more stomachic kind than the above may be prescribed. The infusion of senna, or that of rhubarb, may be given with the infusion of gentian or of columba, or of cinchona, or of cascarilla, and an aromatic or carminative tincture and a neutral salt: or the aperients directed above (§ 34.) may be taken in mint-water. In many cases the compound *galbanum pill*, or *assafœtida*, may be conjoined with the purified *extract of aloes*, or with *rhubarb*, and the inspissated *ox-gall* (See F. 547, 548. 558—563. 572—576.), either at night, or daily with dinner. I have found the following excellent in hypochondriasis with a torpid state of the large bowels.

No. 259. ℞ Pulv. Rhei ʒ ss.; Pulv. Ipecacuanhæ, Pulv. Capsici, āā gr. vj.; Extr. Aloes purif. ℈ j.; Extr. Fellis Tauri ʒ ss.; Saponis duri, gr. xij.; Olei Carui, q. s. Contunde benè, et divide in Pilulas xxx., quarum capiat unam vel duas quotidiè cum prandio.

No. 260. ℞ Extr. Fellis Tauri, Massæ Pilul. Galb. Comp. āā ʒ ss.; Extr. Aloes purif. ℈ j.; Saponis duri, gr. x.; Pulv. Ipecacuanhæ, gr. viij. M. Fiant Pilulæ xxx. Capiat unam vel duas, ut suprà.

36. The use of *laxatives* in hypochondriasis was much insisted on by Renouart and Legier, and various substances belonging to this class were recommended: but they require no very particular remark at this place. *Magnesia*, especially the calcined, is well deserving of adoption, when the complaint is attended by a copious deposit of salts in the urine, or by a gouty diathesis. It also relieves the flatulence and distension of the epigastrium and hypochondria more certainly than any other aperient. When there is no gastro-intestinal irritation, or if this be slight only, it may be given in mint-water, or in any tonic, stomachic, or aromatic vehicle. Precipitated *sulphur* was much praised by Bisset, and is certainly an appropriate laxative, particularly as the use of it for some time increases all the excretions, and especially those from the skin, bowels and liver.

37. *b.* Many of the distressing feelings of the patient are referrible to *irritation* in some part of the digestive mucous membrane. This irritation may exist in the *rectum* in connection with hæmorrhoids, or in the *cæcum*, or in any other part of the canal: but these two are amongst its most common seats. In such cases, it is propagated by the communicating ramifications of the ganglial nerves to the roots of the spinal nerves, or to the spinal chord, and sensibly expressed in some remote part by *reflex sympathy*, as stated in my notes to Richerand's *Elements of Physiology* (p. 34. Lond. 1824. 2d ed. 1829.). The *hæmorrhoidal discharge* has been considered favourable in hypochondriasis by Alberti, Grant and others; but, as already stated (§ 6.), it indicates either general or local plethora, when it has not been induced by costiveness or by acrid purgatives, and points to restricted diet. When the hæmorrhoids are not attended by any discharge, they furnish the same indications and show that, in addition to low diet, general or local bloodletting should be prescribed. Without these, the removal of the hæmorrhoidal affection may not be entirely devoid of risk to the hypochondriac, especially if regular exercise in the open air be not taken.

38. *c.* Simple *lavemens* or *enemata* have been too generally neglected in the treatment of this complaint. The researches of Pinel, Annesley, and of the author, show that the large bowels are not only disordered in their functions, but also often altered in structure, or even displaced in the more severe and chronic cases. The depressed state of organic nervous energy, occasioning hypochondriasis, permits fæcal and flatulent accumulations to form in the *cæcum*, *colon* and *rectum* (see these *articles*), causing inordinate distensions of portions of the canal with spasmodic constriction of adjoining parts. Owing to the fæcal collections, to the efforts of one part of the bowel to propel its contents through a torpid or an obstructed portion, and to the frequent recurrence of these states, displacement of portions of the colon, and even partially of the cæcum, are not rare. Inordinate dilatation of the latter viscus is also sometimes observed. But I have remarked, in several cases of hypochondriasis complicated with hæmorrhoids, or with spasmodic stricture of the sphincter ani, or with fissure or some other source of irritation in the anus, a remarkable *dilatation of the rectum* within the sphincter. In these instances, the dilatation amounted to a sacculated state. This had evidently proceeded from inordinate accumulation of fæces, owing to the obstacle to their discharge, caused by internal hæmorrhoids or by spasm of the sphincter. One of these had been treated for stricture of the rectum, and a bougie frequently passed; but it seldom found its way into the portion of the bowel above the dilatation. The intestine was injured by this officious interference; peritonitis supervened; and near the fatal termination of the case I was consulted. Inspection after death furnished a striking example of this dilated state of the rectum, as well as of the effects of a species of interference generally quite unnecessary, although so frequently practised at the present day by a few

surgeons, as to render it disgusting, particularly as it is warranted neither by the history and nature of the case, nor by sound therapeutical views.

39. In the early stages of hypochondriasis, especially, and as a means of preventing costiveness and the above, as well as other consequences of this state, *enemata* of various kinds, according to the peculiarities of the case, ought to be frequently employed. Simple water, tepid or cold; emollient, oleaginous, or saponaceous fluids, and various saline solutions, will be thus administered with benefit, and will not only promote the action of the aperients just mentioned, but, when daily used, will establish a regular state of fæcal excretion. (See *the Formulæ for Enemata in the Appendix.*)

40. *d.* Whenever the complaint is connected with vascular *plethora*, or is consequent upon the suppression or disappearance of some accustomed evacuation, and when it has been fully developed, an oppressed or *congested state of brain* may exist. But whatever may be the state of circulation in the capillaries or sinuses of this organ, there can be no doubt of the propriety of a moderate *depletion*, by cupping on the nape of the neck, in these cases. I have prescribed it in several instances with marked benefit; and in one gentleman I carried the depletion to thirty ounces at a single operation with the greatest advantage. Many of the patient's distressing feelings depend upon the superinduced disorder of the circulation in the brain, particularly those which are referred to the head, and to the organs of sense and volition. In some cases, however, of this description, blood should be abstracted with caution, and it will sometimes be necessary to promote nervous energy and tone, even whilst we have recourse to depletions and evacuations. Whenever the hypochondriac has encreased heat of scalp with a firm pulse, these latter may be safely prescribed in moderation, and may be aided by cold-sponging the head night and morning, or by daily recourse to the *cold douche* or *shower-bath*. The extremities, especially the feet, of this class of patients are generally cold; this circumstance should receive due attention. When the sufferings are referrible to the brain it will be useless, and indeed sometimes injurious, to attempt to alleviate or suppress them by powerful narcotics. Even when these give temporary relief, more permanent mischief is often occasioned. The means already noticed, both regimenal and medicinal, will be much more efficacious; and, if these fail, when pushed sufficiently far, organic lesions probably exist, for which setons, issues, &c. may be tried, although with but slight prospect of advantage.

41. *e.* If the complaint is associated with *palpitations* or *irregular action of the heart*, or with a *dry nervous cough*, much benefit will result from *camphor*, conjoined with *narcotics*, and sometimes, also, with *refrigerants* and *demulcents*. A weak decoction of *Senega*, with orange-flower water, or with any other aromatic and demulcent fluid, and with small doses of *prussic acid*, or of some other anodyne, will often, also, be of service. If the *liver* be congested, or otherwise disordered, the treatment should be modified accordingly. The majority of cases of this kind, particularly if the patient have lived fully or taken little exercise, will bear *depletion*, especially cupping on the right hypochondrium, or below the right shoulder, or the application of leeches to the anus. A dose of *calomel*, or of PLUMMER's pill, or of blue pill, may also be prescribed; but it should either be conjoined with an aromatic, or some purgative, or be followed, in a few hours, by a stomachic aperient. Hypochondriacs are generally very susceptible of the specific action of mercurials, and their mental depression and nervous sensibility are much increased by them: yet, with due caution, and if not often resorted to, they are beneficial, when the functions of the liver are impaired. The supertartrate of potash, the preparation of *Taraxacum*, and the carbonates of the *alkalies*, with stomachic purgatives, are also of great service in a torpid state of this organ. When, in connection with this, or with a morbid state of the biliary and other abdominal secretions, the hypochondriac complains much of *colicky pains*, with costiveness, flatulence, distension, &c., these, and the mild purgatives already mentioned, calcined *magnesia*, with antispasmodics or carminatives, or with small doses of *ipecacuanha* and *hyoscyamus*, should be steadily employed for some time, and be aided by emollient diluents, by *demulcents*, and by *saponaceous* or *oleaginous enemata*. Castille soap may also be conjoined with the other substances, given in the form of pill.

42. iii. *The third intention is to restore the energy and healthy functions of the organic, nervous, and cerebral organs.* — *Tonics* have been too commonly prescribed prematurely in hypochondriasis, or when the digestive mucous surface, or the brain, or the liver, has not been in a state to derive benefit from them. They are even prejudicial in most of the circumstances which have now been considered, unless in combination with purgatives, especially when these parts are in a state of irritation or congestion, and until this be removed, they may even aggravate the complaint. But when the excretions have been duly promoted, appropriate evacuations procured, and visceral congestion removed, a judicious recourse to them is often of great service. During a course of tonics, the bowels should be kept regularly open, and local irritation or determination of blood prevented or removed, should either appear. The *Chalybeate mineral springs*, already mentioned (§ 32.), are especially beneficial, when tonics are indicated. The preparations of *Iron*, particularly the sulphate, the ammonio-chloride, the potassio-tartrate, and the sesqui-oxide, may be substituted, with advantage, for mineral waters; but if they occasion fever or headache, they will generally be injurious, unless conjoined with saline refrigerants. If *gastrodynia* is complained of, the tonics may be given with anodynes or narcotics, as the *Hydrocyanic acid*, *Hyoscyamus*, the compound *tincture of camphor*, &c., or with the carbonates of the *alkalies*; — the *Tris-nitrate of bismuth* may be prescribed in similar combinations. Where there is a tendency to plethora, tonics, and especially chalybeates, should not be employed, without attention be paid to exercise and diet. When tonics prove too heating, the bitter infusions or decoctions may be prescribed, with small doses of *Nitre*, or of the *Hydro-chlorate of Ammonia*.

43. When Hypochondriasis seems consequent upon venereal excesses, or upon solitary indulgences, or when the sexual appetite is increased, as is sometimes the case, tonics are more especially

indicated, and may be prescribed from the first, if the bowels be kept regularly open. In such circumstances, vascular depletion is contra-indicated, and evacuations of any kind ought to be cautiously practised. The chalybeate mineral waters, soda water, or other waters containing fixed air; the vegetable tonics, with soda; the tincture of the sesquichloride of iron, taken in camphor mixture, &c., are most appropriate in such cases, aided by early rising, and exercise in the open air.

44. iv. A *Fourth Indication* has been advised by some writers, viz. *to restore to its proper seat or form any other complaint, upon the removal or spontaneous cessation of which the hypochondriacal affection had supervened.* This intention, however, cannot be often fulfilled, for an herpetic eruption may not be restored, although an artificial eruption may be easily produced. The restoration of an hæmorrhoidal flux is more readily procured; but a judicious recourse to local depletions, and to suitable diet and regimen, will be still more beneficial. The developement of the gouty paroxysm, when hypochondriasis follows the disappearance of gout, has likewise been advised; but attempts to accomplish this do not always succeed: they may even aggravate the complaint. The means just mentioned will sometimes prove so serviceable, as to render such attempts unnecessary; and yet I have seen instances in which these means have failed, and for which I have been obliged to recommend a more liberal diet and regimen, with change of air, travelling, &c. When hypochondriasis follows periodic fevers, this indication is entirely out of the question. In these cases, as well as in those produced by malaria, humidity, &c., the chylopoietic viscera are generally in fault, and require, especially the biliary organs, strict attention. If this complaint is consequent upon suppressed discharges from the uterus, or is even associated with an increase of the natural evacuation, or with a morbid secretion from this organ, particularly about the change of life, organic change in the uterus may be the cause of the nervous disorder; but the restoration of the discharge in the one case, or the removal of the morbid secretion in the other, will have but little effect, either upon the lesion of the uterus, or upon this affection. The nature of this lesion, and the states of the vascular system, and of the digestive viscera, will require the chief attention in these circumstances.

45. v. *Remedies and Modes of Practice advised by authors.* — *a. General bloodletting* has hardly been noticed by any of the numerous writers on hypochondriasis; and *local depletions* have been directed by few excepting to the anus, in order to remove hæmorrhoids, or hepatic fulness. M. Broussais and Dr. Gully, however, recommend leeches to be applied to the epigastrium on account of inflammatory irritation in the digestive mucous membrane, which they consider to exist in most cases of this complaint; and which no doubt forms a part of the pathological states in many cases. In these, an *antiphlogistic regimen* is always requisite, although too frequently neglected by both patient and practitioner.

46. *b. Aperients* and *laxatives* are generally serviceable when judiciously selected; but acrid purgatives are often injurious, although not to the extent believed by Broussais and his followers, unless they be frequently prescribed. My objections to mercurial purgatives (§ 41.) in hypochondriasis are not altered by what has been advanced by Wintringham, Rieff, Curry, and others, in their favour. At the commencement of this century, a calomel epidemic prevailed in British practice, and this medicine was prescribed very generally, and very often injuriously, in this and many other complaints. The repeated doses of it directed by the late Dr. Curry, not unfrequently aggravated the disorder, or converted it into melancholia. The much milder means, however, recommended by the late Mr. Abernethy, namely, an occasional blue-pill at bed-time, and a stomachic aperient in the morning, were often of great benefit, and were rarely attended by any inconvenience.

47. *b.* The propriety of prescribing *narcotics* and *anodynes* in hypochondriasis has been much discussed. Circumstances often arise to require a prudent recourse to them, and others appear which contra-indicate them. Some of them, particularly *opium*, afford temporary relief, and yet are injurious if largely or frequently employed. — *Opium* was recommended by Tralles (*De Usu Opii*, s. iii. p. 35.), Deidier (*Consult. et Obs.* t. i.), and others, and by Thilenius in conjunction with the mineral acids. Dr. Cullen considered it injurious. Hypochondriacs often resort, and readily become addicted, to it; but, unless when under its influence, all their distressing feelings are aggravated by it. Even when used in moderation, it is relinquished with difficulty. I have met with several instances of hypochondriasis, presenting in some an hysterical character, as in females, and in others, the melancholic, in which opiates had been prescribed occasionally for severe or painful symptoms, and in which calomel had been given as an aperient; and in these the patients afterwards had resorted to the same means without medical advice, until the former was regularly taken in excessive doses, every three or four hours, and the latter every second or third night. In two cases, where the acetate of morphia, and in one, where the muriate had been prescribed, these substances were long afterwards continued three or four times in the day, on account of their effects upon the spirits, and gradually increased to one or two grains each dose. In neither of these was there any organic disease detected upon the strictest examination, although there was much functional disorder of the digestive organs. The strength and healthy looks of these patients are now almost restored, by reducing very gradually the dose of the narcotic: by relinquishing calomel, and by enforcing the practice recommended in this article. Yet I fear that the opiate will never be entirely given up, and that the dose of it will even be increased hereafter. In such circumstances no patient can be trusted. The practitioner, in order to overcome this noxious habit, may try the effect of varying the narcotic, of adulterating it, or of combining it with tonics, aromatics, &c.; of diverting the mind by amusement or travel, and of rousing the vital energies by early rising, exercise, tonics, and light diet. Persons who have habituated themselves to opiates will, however, rarely tolerate any other narcotic. I have prescribed for them *hyoscyamus*, *belladonna*, and *conium*. The first and last of these were too weak: the second seemed for a while to answer, but was soon relinquished. These, however, are

often beneficial in this complaint, especially in certain of its complications, in conjunction with camphor or other antispasmodics, or with purgatives, stomachics, &c.; or with tonics or carminatives, according to the numerous modifications it assumes. The *hydrocyanic acid* is also very serviceable in similar circumstances and combinations, to those in which narcotics are indicated. Thilenius and Wurzer recommended the laurel water in this complaint long before the discovery of its active principle.

48. *c. Tonics* of various kinds have been prescribed in order to rouse the nervous energy: but they require much discrimination for the reasons already stated (§ 42.). As congestions and obstructions of important viscera also should be removed, they ought to follow, or to be conjoined with, means calculated to fulfil this intention, and selected with due reference to it. On this account the preference given to *chalybeate mineral waters*, by Zacutus Lusitanus, Drelincourt, Hoffmann, and others, especially those springs which contain deobstruent and aperient salts, along with the iron, is fully justified. I have seen the *arsenical solution* given in some instances, but it is a precarious medicine in this complaint, — it may be even hazardous, and it is not justified even by the circumstances of the affection having followed periodic fever. I have rarely seen any benefit result from even a moderate use of *wine*. It may afford a temporary relief, but it is most frequently injurious, by increasing vascular plethora, and visceral engorgement. Circumstances, however, may arise, in which it should be prescribed medicinally.

49. *d.* Small doses of *ipecacuanha* have been advised by Hufeland, but they are most serviceable in conjunction with *purgatives*, in order to increase their action, or with *diaphoretics*, when the skin is dry and harsh, and then they should be aided by the warm-bath. The production of *artificial eruptions*, as advised by Ritter, Jenner, and the author; or the insertion of *setons*, or *issues*, as directed by De Meza and others, is often of service, particularly when there is evidence of irritation, or of congestion or obstruction of some internal organ. In these cases, the application of *moxas* or of *blisters*, or of stimulating and *rubefacient liniments*, may likewise be tried.

50. *e.* Dr. Gully justly remarks respecting the *Hygeienic treatment* of hypochondriasis, that the mental distractions accompanying the participation in exciting social scenes, the vigorous exertion of the voluntary power implied in strong muscular exercise, and the shocks given to the entire nervous system, are always beneficial in this complaint. The hypochondriac should be persuaded to the exertion of his volition in active muscular exercises. He does not lack muscular power, but he wants the mental energy necessary to its exertion. He should always walk or ride before his meals, rise early, and take half an hour's exercise in the open air before breakfast. His mental faculties also should be actively engaged, as this writer very judiciously advises, on matters alien to his personal health. His imagination should be roused and directed towards other subjects. Although perturbed only with reference to his health, his fears should be met by the reasoning and feeling of his physician, who should endeavour to gain his confidence by evincing a due interest in his case, and combat his morbid feelings in a manner which an educated tact will readily suggest.

51. Upon the whole, although the treatment of hypochondriacs requires to be modified in a thousand ways to meet the innumerable phases of the complaint, and fancies of the patient, the means advised by Stoll (*Rat. Med.* P. i. p. 245.), will be found the most generally appropriate, and the most beneficial, if persevered in: these are, abstemious diet, early rising with friction of the abdomen in the morning, cold bathing and warm clothing, and exercise in the open air.

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HYSTERIC AFFECTIONS.—SYN. *Hysteria*; *παθος ὑστερικον* (from *ὑστερα*, the womb), *ὑστερικη πνιξ*, *Suffocatio Uterina*, *Suffocatio*, *Suffocatio Mulierum*, Pliny. *Affectio Hysterica*, Willis, Sydenham. *Malum Hysterico-hypochondriacum*, Stahl. *Asthma Uteri*, Van Helmont. *Ascensus Uteri*, *Strangulatio Vulvæ*, *Passio Hysterica*, Auct. var. *Hysteria*, Sauvages, Linnæus, Vogel, Cullen. *Hyperkinesia Hysteria*, Swediaur. *Clonus Hysteria*, Young. *Suspasia Hysteria*, Good. *Vapeurs*, *Mal de la Mère*, *Affection Hystérique*, Fr. *Mütterkrankheit*, *Mütterbeschwerden*, *Aufsteigen der Mütter*, Germ. *Isterismo*, *Mal di Matrice*, Ital. *Fits of the Mother*, *Rising of the Mother*, *Vapours*, *Hysterics*, *&c.*

CLASSIF. — 2. *Class*, Nervous Diseases; 3. *Order*, Spasmodic Affections (*Cullen*). 4. *Class*, Diseases of the Nervous Function; 4. *Order*, Affecting the Sensorial Powers (*Good*). II. CLASS, III. ORDER (*Author*, in *Preface*).

1. DEFIN. — *Nervous disorder, often assuming the most varied forms, but commonly presenting a paroxysmal character; the attacks usually commencing with a flow of limpid urine, with uneasiness or irregular motions, and rumbling noises in the left iliac region, or the sensation of a ball rising upwards to the throat, frequently attended by a feeling of suffocation, and sometimes with convulsions; chiefly affecting females from the period of puberty to the decline of life, and principally those possessing great susceptibility of the nervous system, and of mental emotion.*

2. Under this definition may be arranged all those disorders which, from their varied and changing forms, and their resemblance to many serious, and even to several dangerous or structural diseases, have puzzled and misled the inexperienced. SYDENHAM first gave a full, and, upon the whole, a satisfactory account of hysterical affections; and WHYTT more recently threw additional light on several of their forms and relations. CULLEN accurately described their more convulsive states, but neglected those anomalous or irregular forms of complaint, which are equally frequent and important with these. From the descriptions of GOOD, MACINTOSH, and some other recent writers, it might at once be inferred that their experience as to this disorder was very imperfect; that they were entirely ignorant of the writings of SYDENHAM and WHYTT; and that the state of our knowledge in respect of it had retroceded, instead of having advanced, with the general progress of science. Very recently, however, the able and elegant treatise of Dr. CONOLLY has retrieved the character of our literature as to hysteria, and furnished us with a more comprehensive view of its nature and treatment.

3. The varieties, forms, and states of hysterical affection are so numerous, that the difficulty of describing and arranging them is very great. The modifications consequent upon age, temperament, diathesis, habit of body, states of nervous susceptibility, physical and moral education, and on the states and grades of society, are so various, that they cannot all be comprised within the limits to which I am necessarily confined. Enough, however, will be advanced to guide the practitioner to the recognition of the nature of such affections as may not fall exactly under any of the varieties

into which I shall divide this complaint. The difficulty of accurately describing disease is great, inasmuch as the phenomena constituting it vary in every case with the circumstances just enumerated, with the causes producing them, and with numerous accidents and occurrences, independently, even, of their duration and intensity; but it is especially great in respect of hysteria. In the history about to be given of it, I shall notice — 1. Its more mild and regular forms; — 2. Its more severe states; — and, 3. The more irregular and anomalous conditions or modes in which it sometimes manifests itself.

4. I. THE MILDER AND MORE REGULAR FORMS OF HYSTERIA present various modifications, depending chiefly upon the number of the circumstances or symptoms characterising them. — *a.* They appear generally in paroxysms or fits, and commonly begin by painfulness or uneasiness in the left iliac region, or hypogastrium, or in the left side; and are often preceded by a large flow of limpid urine, or by palpitations, or difficulty of breathing, flatulency, and rarely by nausea, or vomiting. From either of these situations in the abdomen, a ball, the *globus hystericus*, seems to move, with a rumbling noise, and with various convolutions, to the stomach, and thence to the throat or pharynx, where it remains for some time, and gives rise to a feeling of impending suffocation. The attack in its slighter forms may not proceed further, or it may be attended by several other phenomena of a slight or severe kind. In some cases, headach, stiffness about the larynx, dyspnœa, general uneasiness, cramps, &c., precede or accompany the attack; in others, a vermicular or undulating motion of the abdominal muscles attends the rising of the ball, or *globus*.

5. *b.* The seizure, however, may not end with a sense of strangulation, attending the ascent of the ball to the throat. Other phenomena either attend this, or rapidly follow it, particularly lassitude, sadness, despondency; a sense of coldness, stiffness, or weight in the limbs, with sudden and momentary spasmodic contractions, or general shudderings; headach, noises in the ears, or vertigo; pain and flatulence of the stomach; irregular distension of the abdomen, with borborygmi; a sense of constriction in the throat and pharynx, sometimes with swelling; oppression at the chest, dyspnœa, and irregular breathing; and palpitation, or irregular action, of the heart. These fits may occur at any time through the day, but usually two or three hours after a meal. After a time, either copious eructations of air take place, or anguishing pain at the epigastrium, or in the left side, supervenes, which the patient endeavours to relieve by rubbing violently with the hand. She is frequently incapable of utterance, although evincing much bodily and mental agitation, which generally terminates with immoderate or continued fits of laughter, sometimes causing temporary or alarming suspension of respiration, or with fits of weeping, without any assignable cause, or with an alternation of both. With these latter symptoms, the attack may cease. It may recur in a short time, or not for a considerable period.

6. *c. When hysteria assumes a truly convulsive form,* spasmodic actions follow upon the feeling of suffocation, occasioned by the globus hystericus, as it reaches the throat. In delicate women, with great mobility of the muscular system, the convulsions are feeble, and present chiefly a clonic or asthenic character; but in the strong and plethoric, they are more sthenic or tetanic. The trunk of the body is writhed to and fro, and the limbs are variously agitated, one arm and hand (most frequently the right) commonly beating the breast repeatedly. The patient often beats her head against the bed or couch, tears her hair, screams, shrieks, laughs, or sobs and cries immoderately. Sometimes the trunk remains stiff, whilst the arms and limbs are tossed in every direction. The muscles of respiration participate in the struggle, and breathing is effected slowly, laboriously or deeply, and spasmodically, often with deep sobs and constriction in the situation of the diaphragm, and occasionally with hiccup. The respiratory efforts are rendered still more laborious by spasm about the throat, pharynx, and glottis, and the patient often applies her hands to her neck and throat, and rubs or strikes the epigastrium, or left side, with the hand: during the struggle, she sometimes bites her arms or hands, or even the bystanders. The abdominal muscles are tense, or irregularly constricted; the belly, especially about the navel, is often drawn inwards, and the sphincters are firmly constricted. The action of the heart is increased with the severity of the convulsions. In some cases, however, it is not much, if at all, accelerated; in others, it is very irregular and unequal; and in all, the veins of the neck are remarkably distended, the carotids beating with more than usual strength. The face is flushed and tumid, or full, particularly in the plethoric; but in delicate females, it is occasionally pale. The temperature is usually reduced, especially in the extremities, at the commencement of the attack; but it is increased as the convulsions proceed, although in the non-plethoric, it sometimes either continues below, or does not rise above, the natural standard.

7. The *duration* of the fit varies from a few minutes to two or three hours. The recovery from it is attended by a flow of tears, or by a fit of laughter, or by an exclamation, and is generally rapid and complete. Sometimes the patient complains of numbness, or partial palsy of a limb, or of headach, or of loss of voice, after a seizure. And when a copious discharge of limpid urine has not ushered in, it often follows, or both precedes and follows, the attack. Exhaustion, with a desire of remaining perfectly quiet, attends the cessation of the convulsions, but the patient is soon restored to her usual state. She usually retains more or less consciousness of what has occurred in the fit, although she wishes to be thought unconscious of all that has taken place. Loss of consciousness may, however, exist when the fit assumes a very severe or an epileptic form, which it sometimes does in plethoric females; but it is not a general symptom of the purely hysterical convulsion, though ascribed to it by CULLEN and many others. Such fits are ready to recur from time to time; and in the intervals, the patient displays much fickleness, or irritability of temper, is capricious, or even experiences fits of laughing or crying, or of both.

8. II. THE MORE SEVERE FORMS OF HYSTERIA vary more in their characters than in their intensity. — In some cases, particularly in the plethoric, and when the attack is consequent upon obstruction or suppression of the catamenia, the fit presents

most of the symptoms of an epileptic seizure. But the accession is not so sudden as in it, and many of the premonitory symptoms of Hysteria are present. The subsequent exhaustion, stupor, or sleep, is also not so great as after a fit of epilepsy, and the patient rarely injures the tongue or foams at the mouth. She is, however, generally deprived of consciousness. The face is tumid and flushed; the trunk presents a tetanic stiffness, whilst the limbs are tossed in every direction; and respiration is so laborious and so obstructed as apparently to threaten dissolution. In some cases, the patient remains for a time seemingly without breathing, the throat and the veins of the neck being remarkably swollen and distended; and the action of the heart, irregular, hurried, or slow, or entirely interrupted for two or three beats. In other instances, she screams, or utters the most disagreeable and unnatural noises, and grinds the teeth. At last the convulsions cease, and after a period of more or less exhaustion, she recovers, often complaining of headach or slight fatigue.

9. In some instances, after a severe fit, or after violent nervous agitation, and great disorder of the circulating and respiratory functions, the patient sinks into a state of coma, or of hysterical apoplexy, depending upon cerebral congestion. In other cases, a complete state of collapse takes place, respiration being hardly observable, and the pulse so weak, slow, and small, as not to be felt at the wrist. The surface and extremities become pale, cold, and inanimate; and the patient continues in this almost lifeless state for a considerable time. Some of the instances of supposed death, in which persons have been said to have nearly escaped being buried alive, have been of this kind. I have seen some instances of this form of hysteria — *hysterical syncope* — so severe as to occasion some alarm, and M. VILLERMAY considers that death may supervene upon it. Extreme cases of this description have been noticed by PLINY, LANCISI, and others; the instance in which VESALIUS began to dissect a body to which life returned on the application of the scalpel, was probably of the same nature. But cases of hysterical coma, or of apoplectic congestion consequent upon the hysterical paroxysm, should not be confounded with these. In hysterical coma, the pulse is but little affected; but in hysterical syncope, it can hardly be felt at the wrist. Upon recovery from these states, especially from the latter, the patient often experiences catchings, spasmodic contractions of the extremities, shudderings, or convulsions of short duration, accompanied by forced or irregular respiration. Sometimes the paroxysm is not only severe, but is attended or followed by a kind of delirium, or by nymphomania of short continuance.

10. In a few instances, especially where hysteria is obviously dependent upon irritation or congestion of the uterus or ovaria, the paroxysms change their character and assume the form of *catalepsy*, *extasy*, or of *somnambulism*, or either of these nervous affections takes the place of the hysterical seizure. I have seen several instances, illustrating the connection of these with the severer forms of hysteria; and in some, the tenderness in a portion of the spinal column, so much insisted on by some recent writers, was detected. When these nervous affections are thus associated, the attack may commence, either as a slight, or as a severe hysterical fit, and pass in a short time into the cataleptic or extatic state, or it may begin in the form of extasy, catalepsy, or somnambulism, and pass into the hysterical convulsion: but I have likewise seen the paroxysm consist of one of these in its pure or unassociated state. Besides these more severe states of the complaint, various symptoms may assume an unusual and distressing prominence; the sense of strangulation in the throat may be so great as to occasion the utmost distress and alarm, and it may be accompanied by inability of utterance, by flatulent distension of the belly, borborygmi, and remarkable undulations throughout the abdomen. Occasionally the slighter and severer forms of the complaint will alternate with each other; and the latter is frequently induced when the former has existed, by powerful mental emotions or sudden impressions. Sometimes the severer fits alternate with loss of voice, — *Aphonia hysterica*; — or with temporary paralysis of certain parts, giving rise to *dysphagia*, or to *ischuria* in some instances; and they may even terminate in *epilepsy*, *mental derangement*, or *fatuity*. In some instances of severe hysteria in the unmarried state, I have observed puerperal mania supervene after marriage, and follow almost each confinement. These states of hysteria occur not merely in different persons, but sometimes in the same person at different times. Females who are liable to, or who have suffered from, the disease, often acquire so much sensibility, or become so susceptible, as to be strongly affected by every impression that occurs suddenly or by surprise.

11. In *the intervals* between the paroxysm, the general health is more or less deranged; but some functions betray more disorder than others. Digestion is impaired, and there is often a craving after indigestible or hurtful articles, as cheese, cucumber, acid fruit, acids, pickles, &c.; or after food at improper hours. Digestion is usually attended by flatulence, borborygmi, lowness of spirits, and proneness to tears. The bowels are commonly costive; but they are sometimes lax or irregular. The tongue is red at the point and edges, and slightly furred or loaded, or somewhat white in the middle and base. The pulse varies, the least emotion or surprise causing great acceleration of it, or palpitations of the heart. The catamenia are seldom regular as to quantity, or the period of appearance. They also often depart from the healthy character, in the various ways described in the article MENSTRUATION. They may moreover be delayed, retained, suppressed, too frequent, excessive; or they may be painful, difficult, and attended by various phenomena, referrible to morbid conditions of the uterus or of the ovaria. They may also be preceded or followed by leucorrhœa. So much is the health of hysterical females disordered, and so intimate a connection often exists between such disorder and the hysterical paroxysm, that the latter, especially in its slighter forms, seems merely an aggravation, or an exacerbation, of the more or less continued complaint, or as an increased state of the nervous symptoms.

12. In those cases, which are more obviously dependent upon uterine irritation or vascular determination to the sexual organs, irregular or painful menstruation is generally observed, and the discharge is preceded or attended by pain in

the back, loins, or thighs, or in the sacrum and hypogastrium, with forcing or bearing down, and sometimes by tenderness upon pressure above the pubis. Leucorrhœa is usually present, and sometimes also *dysuria*, or even *stranguria*, although not always mentioned or admitted by the patient. The menses may be very irregular, — at one time excessive, and at another, scanty; — now too frequent, and afterwards disappearing for months. The hysterical paroxysm is often connected with the approach or presence of the catamenia; but it is also often brought on at other times by mental emotions or surprise, and by fatigue, and in some instances it is characterised by signs of an unusual increase of the sexual appetite, amounting in some cases to temporary nymphomania, and constituting the *Hysteria libidinosa* of nosologists.

13. III. THE IRREGULAR AND ANOMALOUS STATES OF HYSTERIA are so diversified that a full account of them can hardly be comprised in the limits of this article. As well as the more fully developed affection they frequently depend upon excitement of the sexual nerves by feelings connected with the instinctive affections and appetites, or upon local irritation of the uterine system. In either case, the one acts upon the other—the mental excitement upon the organic functions, and the local irritation upon the mind; and brings within the range of its morbid influence various parts of the nervous circle; the altered sensibility attendant upon the local affection being manifested, not only in the primary seat of disturbance, but also in other parts, with which there is the most intimate sympathy in particular cases, or which, owing to their naturally exalted state of sensibility, most readily participate in the original affection. Granting that the nerves supplying the uterus, the ovaria, and the more external parts of generation, are in a state of morbid irritation — a state which the conditions and functions of those parts, as well as the symptoms, render extremely probable, — the influence extended to other parts of the economy, particularly in susceptible or delicate persons, may be readily inferred. The relations of these nerves to those supplying the respiratory, circulating, and digestive organs; the circumstance of their being a part of the same system; the effects which they produce, both directly and indirectly, upon the circulation in the brain; and their intimate connection with the nerves of sense and of the spinal axis, will serve to explain many of the phenomena, and to account for the multiplied mutations, observed in hysterical affections. When a disposition to irritation or morbid excitement exists in the uterine nerves, those emotions or feelings which have an intimate relation to sexual function, will often be sufficient to rouse this irritation, and to bring in its train certain of the various morbid manifestations generally associated with it, and constituting its more outward and evident phenomena. The intimate connection existing mutually between certain mental emotions and uterine disturbance, whether the mental or the organic sensibility be first excited, and the close association of both with the more prominent symptoms of hysteria, are so fully established, and are so important in a practical point of view, that they should never be overlooked when affections of an anomalous, an irregular, or Protean form, occur in females from the period of puberty to the decline of life. Many of the affections during this period of female existence not only proceed from the source here stated, and are truly hysterical in their pathological relations, but also simulate other maladies of a more serious nature, and therefore require to be accurately recognised in practice. They, moreover, do not only occur in different cases, but sometimes also several of them may appear in succession in the same person, or two or more of them may exist at the same time, thereby increasing the difficulty of diagnosis.

14. *A.—Altered sensibility, or pain of a truly hysterical nature*, is a frequent occurrence, and in some cases may be mistaken for inflammation of a subjacent or adjoining viscus. The situations in which hysterical pains are most frequently felt, are — *a.* The head, often attended with the clavus hystericus; — *b.* Below the left mamma, or at the margins of the ribs; — *c.* In the region of the stomach and spleen; — *d.* In the course of the descending colon, and in the left iliac region; — *e.* Above the pubis; — *f.* In various other parts of the abdomen, or in the abdomen generally; — *g.* In the region of the kidneys, sometimes extending in the course of the ureters; — *h.* In one or more of the lower dorsal or lumbar vertebræ; — *i.* In the sacrum; — *k.* In the hip, or knee joint. Although these are the more frequent situations, pain may be felt so seriously in others, as to alarm the patient, as in the pharynx and larynx, in one or both mammæ, or in the region of the liver. —

15. *a.* Headach, with or without the *clavus hystericus*, generally limited in extent, especially to the forehead, is a frequent circumstance in both the regular and anomalous forms of hysteria; but I must refer the reader to what I have stated respecting it in the article HEADACH (§ 10.).

16. *b. Pain below the left mamma, and above the margin of the left ribs*, is a very frequent occurrence. It may continue for weeks, or even for months with little intermission. It is very circumscribed, is seldom attended with cough, but frequently with palpitation of the heart, and with increased sensitiveness to the impulse of this organ. It is sometimes, although not necessarily, increased by a forced inspiration, and by external pressure. The precise source of this pain cannot be stated with certainty. DR. ADDISON examined the body of a young woman who had this pain for a considerable time in an aggravated degree, and who died suddenly in a fit. The colon, spleen, heart, and stomach were unaltered, but the cardiac orifice of the stomach was surrounded by a ring of red injected vessels. — Pain in these situations depending upon imperfectly developed hysteria is frequently mistaken for *pleuritis*. The absence, however, of cough, the quiet state of the pulse, particularly when the patient is in the recumbent posture, the versatility and mutability of many of the symptoms, the variability of the patient's mental motions, the existence of disordered catamenia, and especially the absence of the stethoscopic signs of the inflammatory disease, will be sufficient to indicate the nature of the affection. When this pain is attended with palpitations or with morbid sensitiveness of the heart's impulse, and especially if these alternate, or are connected with leipothymia or syncope, *pericarditis* or organic *disease of the heart* may be erroneously suspected by both the patient and the practitioner. But a careful examination into the rational symptoms, comparing

them with the signs evinced by percussion and auscultation, the occasional appearance of decidedly hysteric symptoms, as borborygmi, clangor intestinorum, the globus hystericus, uterine disturbance, and the state of the mind, will here disclose the nature of the disease. In this class of cases, there is also more or less disorder of the digestive organs, and in some, tenderness upon pressure of some of the dorsal vertebræ (§ 23.).

17. *c. Pain in the regions of the stomach and spleen* is another frequent manifestation of hysterical disorder, and is often so intense in the former that the patient screams, leans forward, and expresses the utmost agony. It generally comes on suddenly, and lasts from a few minutes to an hour or more. It is increased by pressure, although not very materially, and the pulse is not much affected. This pain may exist without any nausea or retching; but the bowels are usually costive or irregular. It is sometimes accompanied with a sense of heat or irritation in the pharynx, or is followed by a burning sensation at the epigastrium. There seems to be a very intimate sympathy between the *spleen* and the uterus; irritation of the latter exciting the sensibility and organic contractility of the former in such a manner, as to occasion a belief that it is actually the seat of inflammatory action. The pain felt in the region of the spleen in hysterical cases is never so severe as that which is strictly referrible to the stomach, and pressure is endured much better in the former than in the latter, and often even gives relief. In all such cases, there is no swelling present as in *splenitis*, for which they may be mistaken; but attention to the history of the case, and the good effects of tonic and antispasmodic treatment, will remove any difficulty as to diagnosis, particularly if the functions of the uterus receive due attention.

18. *d. Pain in the course of the descending colon, and in the left iliac region*, may be the only or principal complaint in irregular hysteria. It generally also attends other forms of the disease, and is most frequently seated in the region of the sigmoid flexure, and is attended and aggravated by flatus, which causes a rumbling noise, followed by the globus hystericus, and occasionally by other nervous symptoms. In some instances, the connection of this pain with uterine disorder is very obvious; in others, it is much less so. It is generally independent of disorder of the bowels, although irregularity of them is very frequently observed. That it is purely nervous, is proved by the symptoms, and by the effects of remedies.

19. *e. Tympanitic distention of the intestines* is not an uncommon symptom in hysterical females. Sir B. BRODIE states that it has been mistaken for ovarian dropsy, and that the majority of cases of this disease supposed to be cured by iodine and other remedies have been of this nature. I was the first to employ, and to recommend the use of iodine in ovarian dropsy, and I have derived great benefit from it in several cases; but I cannot see how these affections can be confounded with each other, as the diagnosis is remarkably easy. The absence of fluctuation, and the tympanitic sound produced by percussion, sufficiently indicate the cause of distention. It is only when flatus accumulates about the sigmoid flexure of the colon or in the cæcum that there is any resemblance to ovarian dropsy; but other regions, or the abdomen generally, may be distended by flatus, so as to occasion much pain, to impede respiration, and even to disorder the heart's action.

20. *f. Pain above the pubis* is sometimes complained of, but is rarely the only, or even the principal complaint. It is usually attended by more or less tenderness on pressure, and fulness in this situation, with disorder of the excretion of urine. It is generally associated with colicky pains in the abdomen, or in the loins, sacrum, or adjoining parts. It seems to depend upon congestion of the uterus, as it is frequently relieved by local depletion, and by the increase and regular return of the catamenia, which are commonly irregular or scanty. Pain, however, in this situation may attend an excessive discharge, as well as certain forms of leucorrhea. When it accompanies the former, it depends upon irritation, and is more decidedly nervous, unless in very plethoric females, in whom an excessive discharge proceeds from active determination of blood to the uterine system. In some cases of this kind, also, the digestive organs and the functions of the kidneys are much disordered.

21. *g. Irregular hysteria may be manifested by pain in various parts of the abdomen, or in the abdomen generally*, especially about the period of the catamenia, and when they are difficult or scanty. The pain often assumes a colicky character — the *Colica hysterica* of various authors, — and shifts its situation. When it extends over the abdomen, it is sometimes accompanied with excessive tenderness, and great inflation of the bowels. It may then be mistaken for *peritonitis.* Attention, however, to the pulse, the uterine discharges, to the fæcal and urinary excretions, and to the manner and state of the patient's feelings, will assist the diagnosis. In this form of hysterical affection, a marked incongruity will be observed between certain symptoms: greater pain and tenderness will be felt than the pulse, the tongue, and the evacuations should indicate; the most urgent symptoms will suddenly disappear, and as suddenly return; the mind will be variable and susceptible, and some unequivocal hysterical symptom will often arise. The pain and tenderness will frequently shift their situation; the urine will be natural, or pale and copious, instead of being scanty and high-coloured as in peritonitis; and the appearance of the countenance and the postures of the patient will be very different from those observed in inflammations seated in the abdominal cavity. The existence of some derangement in the periods, continuance, quantity, and quality of the uterine discharge, or of pain and difficulty of its accession, or of leucorrhœa, will also tend to confirm the diagnosis.

22. *h. Pain in the region of the kidneys* sometimes extending in the course of the ureters, and even to the urinary bladder, is occasionally the principal affection in hysterical patients. This pain is generally severe and sudden in its attack. When it extends to the bladder, dysuria is often present. This symptom is liable to be referred to inflammation of the kidneys: but here also attention to the existence of uterine disturbance; the marked incongruity of symptoms, particularly between the state of the pulse, the secretions, and evacuations on the one hand, and the pain on the other; the frequent shiftings, the sudden accession, and the as sudden cessation of the pain; and the absence of numb-

ness in the thighs, of vomiting, and of symptomatic fever, will point out the nature of the affection.

23. *i. Pain in the dorsal or lumbar vertebræ,* with tenderness upon pressure of the spinous processes, is often complained of by females of a delicate constitution; and, although it may exist independently of hysteria, yet it is frequently associated either with it, or with uterine irritation. Pain in any of these situations is often also connected with neuralgic affections in various parts of the body, especially in the mammary and intercostal nerves, and in the nerves of the lower extremities, as well as with certain affections of the joints, about to be mentioned. Much diversity of opinion exists as to the nature of the pain and tenderness complained of in the spine, and as to its relation to hysteria and to uterine disorder. It cannot be doubted, that it is frequently connected with one or the other, or with both, and that it may exist independently of either. It is also obvious that, although uterine irritation is often accompanied with hysteria, or with pain and tenderness in the spine, or with both, yet it may be present without either. This affection of the spine has been imputed to inflammatory action in the spinal cord or its membranes, or in some of the adjoining structures; but the accompanying symptoms, the duration of the affection, and the effects of treatment do not warrant this inference as respects at least the majority of cases. It has therefore been attributed to congestion, or to that very indefinite state, to which the term irritation has been applied; but the evidence as to the existence of either of these is entirely of a negative kind. It is probable, however, that the uterine disorder, or the morbid state of the uterine nerves, is propagated by the sympathetic system to the roots of the spinal nerves, and that the sensibility of these last is thereby modified, either in this situation or in one or more of their ramifications. Here, as in many other cases, the primary affection of the ganglionic nerves may not be attended by any painful feeling, although it may induce pain in the voluntary nerves, which it consecutively implicates. From this it will appear, that I ascribe the tenderness and pain in the dorsal or lumbar spine, sometimes associated with hysteria, as well as the painful or neuralgic affections, the tetanic and convulsive actions of the voluntary muscles, &c., to irritation or excitement propagated from the uterine nerves by means of the sympathetic to the roots of the spinal nerves, and to the spinal cord itself. But I at the same time admit that more or less of congestion, or of otherwise disordered circulation in the cord and its membranes may sometimes be also thus produced, giving rise to various paralytic or anomalous symptoms sometimes associated with those already mentioned.

24. Hysterical affections, in which the symptoms are referred to the spine, are sometimes mistaken for ulceration of the intervertebral cartilages and bodies of the vertebræ. Sir B. BRODIE has seen numerous instances of young ladies being condemned to the horizontal posture, and to the torture of caustic issues and setons for successive years, whom air, exercise, and cheerful occupations, would probably have cured in a few months. (*On Local Nervous Affections, &c.* p. 46.) Similar instances have occurred to myself, and are familiar to most physicians. When the pain is first complained of in the spine, an attentive examination is often necessary to a positive diagnosis. When it is truly hysterical, it is seldom confined to a single spot, and it often shifts its place. The tenderness of the part is peculiar, and the patient often flinches more when the skin is slightly pinched, than when pressure is made on the vertebræ. The pain is even severer than in real vertebral disease, and when spasms are present they often resemble the muscular contractions in *chorea.* Sir B. BRODIE observes, that surgeons sometimes apply a hot sponge to the spine, believing that, if the patient complains of pain on its application, this is a proof of the existence of *caries.* I perfectly agree with him in considering that a patient labouring under a nervous pain in the back, will complain of the hot sponge even more than one in whom real disease exists. The history of the case, the appearance of other hysterical symptoms, the state of the catamenia, the aspect of the patient, her age, and other circumstances already noticed (§ 21, 22.) will assist the diagnosis.

25. *k. Pain in the sacrum and os coccygis* depends upon irritation or disorder of the uterus, although the uterine discharge may not be manifestly deranged. It is sometimes associated with pain and tenderness above the pubis (§ 20.). I have met with several cases, in which pain in this situation has been referred to inflammatory action, or to organic lesion, and been greatly aggravated by depletions and a lowering regimen.

26. *l. Painful affections of the joints* are not infrequent in hysterical females. The joints most commonly attacked are the knee joints, but I have also met with it in the hip joint, the ankle, and in the wrist. Sir B. BRODIE, whose experience of these complaints has been very extensive, states that "at least four fifths of the females among the higher classes of society, who are supposed to labour under diseases of the joints, labour under hysteria, and nothing else." In such cases, the pain is not generally fixed in any one part, but belongs to the whole limb; and when the symptoms are referred to the hip joint, the patient winces and sometimes screams, when either the hip, or the ilium, or the side even as high as the false ribs, or the thigh or leg, as low as the ankle, is pressed upon. The morbid sensibility is chiefly in the integuments; and if they are slightly pinched or drawn from the subjacent parts, the patient complains more than when the head of the femur is pressed into the acetabulum. The more the patient's attention is directed to the part, the more is the pain increased; but if her attention be directed otherwise, she will hardly complain. There is no wasting of the glutei muscles, nor flattening of the nates, nor painful startings of the limb at night, nor frightful dreams, as in true hip joint disease. Sometimes this hysterical affection is attended by much swelling of the nates, or of the thigh, without leading to abscess, owing to turgidity of the small vessels, and to effusion of the more deep-seated cellular tissue. In a case which I am now attending, there is a defined and circumscribed swelling; but there is not the least fluctuation, redness, nor throbbing. Instead of the wasting of the glutei muscles attending hip-joint disease, there is a bulging of the pelvis posteriorly, at the same time that it is elevated on the affected side. Hence the limb is apparently

shortened, and when the patient stands erect, the heel does not come in contact with the ground. This is owing to the predominant action of certain muscles, and to a long-continued indulgence in an unnatural position.

27. When the affection is referred to the *knee*, it resembles that just described. There is great tenderness, but it extends some distance up the thigh and down the leg, sometimes to the ankle and foot. The morbid sensibility is chiefly in the integuments, and not in the deep-seated structures. The leg is usually kept extended, and not bent as in disease of the knee joint. There is occasionally swelling, but this is rarely very great. In a case, however, that I attended, the swelling was very great, its accession and disappearance being sudden. Sir B. BRODIE remarks that this affection may continue without material alteration for weeks, months, or even for years. In the case just now referred to, recovery took place in a few days.

28. In hysterical affections of the joints, the catamenia are usually scanty, suppressed, or otherwise irregular. The extremities are frequently cold, and the affected limb is sometimes cold, and at other times warm; or there are frequent alternations of heat and cold. Occasionally towards evening, the surface of the affected joint is hot to the touch, and the vessels turgid; but there is no throbbing or other indications of the formation of matter. As in many other forms of local hysteria, these affections generally appear during bodily exhaustion, or mental depression: they are often excited by the depressing emotions of mind, and are as often benefited by whatever rouses the mental influence, or leads to bodily exertion.

29. *m. Painful affection of the breast* is sometimes met with in females subject to hysterical disorder, and is always connected with derangement of the uterine system. In some instances, especially in the more prolonged, the pain is attended with hardness and swelling of the gland. This affection is liable to be mistaken for a much more permanent and severe disease of the organ. It has been described by Sir A. COOPER and Sir B. BRODIE; but it has been noticed by numerous other writers, in connection with hysteria and uterine disorder, and, in rarer cases, with pain in the course of the spine. The patient shrinks from pressure, and cannot bear even the skin to be slightly pinched. The examination of the part often produces twitches, or motions resembling those of *chorea;* yet, if her attention can be engaged otherwise, neither much pain, nor these motions, will be occasioned. The morbid sensibility frequently extends to the axilla, and down the arm. This affection usually disappears after a treatment judiciously directed to the removal of congestion or irritation of the uterine organs, and to the regulation of their functions.

30. *n. Pain is sometimes complained of in the region of the liver, and at the margin of the right ribs.* — It may be mistaken for chronic *hepatitis*, and there may be some difficulty in forming the diagnosis. I was lately consulted in a case of hysteria, where pain in this situation was a prominent circumstance, and was associated moreover with jaundice. A free use of mercurials had increased the hysterical affection, without benefiting the jaundice. This latter, however, disappeared during the use of the alkaline subcarbonates and taraxacum, with gentle bitters and tonics, and antispasmodics. The history of the case, the state of the uterine functions, the appearances of the tongue and of the alvine evacuations, and the absence of pain at the top of the right shoulder, will readily distinguish this affection from chronic hepatitis. The other circumstances alluded to above (§ 21, 22.) will also assist the diagnosis.

31. *B. Irregular hysteria giving rise to, and simulating various spasmodic affections.* — *a.* Sometimes the respiratory organs are the seat of the spasmodic disorder. Occasionally the attack resembles that of *asthma*, the paroxysm of dyspnœa being preceded or attended with many of the symptoms of the hysterical fit. In other cases the patient is liable to paroxysms of a dry convulsive cough — the *Tussis hysterica* of authors. Not unfrequently the hysterical tendency manifests itself by severe or repeated attacks of *hiccough*, or of *sneezing*, sometimes accompanied by loud exclamations. Occasionally, the spasmodic disorder affects some portion of the digestive tube, or shifts along it, giving rise to *dysphagia*, or to porraceous vomiting, or spasmodic gastrodynia, or to colic — the *colica hysterica* of authors. *Hysterical dysphagia* is sometimes attended by the globus hystericus, borborygmi, and even by a dread of swallowing fluids, or *hysterical hydrophobia*. *Hysterical gastrodynia* and hysterical colic are frequent attendants upon difficult, scanty, or otherwise disordered menstruation.

32. *b.* Hysteria may manifest itself chiefly by spasm of the voluntary muscles, giving rise to affections resembling *trismus*, *opisthotonos*, or *pleurosthotonos*. It may also occasion certain anomalous convulsions, and a form of *chorea*, which may be termed hysterical, as partaking of many of the characters of both diseases, and occurring about the period of puberty, generally in consequence of disordered menstruation. In all these affections the pulse is soft, and generally quick, particularly when the patient is erect or sitting up; but it becomes much slower, or natural, as to frequency, when she is recumbent. Irregularity of the menstrual discharge, or leucorrhea, and pain in the left side, or in the region of the spleen, and sometimes tenderness or pain in some part of the spine, attend these affections. The same symptoms, circumstances, and peculiarities, already alluded to with reference to painful hysterical affections, (§ 21.), will also serve to point out the nature of those just mentioned.

33. *C. Hysteria sometimes gives rise to various comatose, cataleptic, or soporific states.* — These states may supervene on imperfectly developed hysteria, or be preceded by hysterical symptoms, particularly borborygmi, the globus hystericus, a variable and excited state of mind, by uterine disturbance, or sudden arrest of the catamenia, &c.; and they may be directly occasioned by fright, sudden surprise, by various mental emotions, sexual excitement, or whatever startles or unexpectedly affects the patient. In these cases the irritation, whether mental, cerebral, or uterine, seems to induce congestion of the vessels of the head, or impeded circulation through them. — *a.* The relation of *catalepsy* to uterine or sexual excitement, and consequently to hysteria, has been manifested in most instances. Since the article CATALEPSY was written, I have seen two cases of this affection, and in both these, as well as in those noticed in that article, this relation was

evinced. In one of these, the attack was observed by Mr. BYAM and myself from its commencement until its termination.

34. *b. Coma* also occurs in rare instances, and even assumes the form of congestive apoplexy: the patient is insensible, the pulse is regular and full, the respiration is calm or profound, and the face is either natural or flushed. The seizure is usually preceded by indications of hysterical disorder, or of uterine affection; its duration varies from a few to many hours; and unless the patient be injudiciously treated, owing to its being mistaken for apoplexy, it terminates in rapid or sudden recovery of consciousness or voluntary motion, without any paralytic affection. This attack is merely a modification of catalepsy, or it nearly approaches the latter in certain of its states. At the time of writing this article, I was requested by Mr. GRANT, of Thayer Street, to see a female, who suddenly became comatose after evincing hysterical symptoms. He judiciously directed cold applications to the head, and a continuance of these for a few hours restored the patient.— The *soporific* form of the attack, or that in which the patient lies as in a profound sleep, respiration being so low as hardly to be noticed, and the pulse weak and small, is more frequent than the foregoing, and has been noticed by WHYTT, VILLERMAY, CONOLLY, and others.

35. *D. Hysteria may simulate paralytic affections.* — In such cases, there is seldom a fully developed state of hysteria, but merely an occasional manifestation of certain of its symptoms, and a concomitance of uterine disturbance in some one of its forms. In most instances of these, as well as of other irregular hysterical affections, the variable character of the temper and mind, and the exalted sensibility and irritability of the body, are evinced. — *a.* The paralytic form of hysteria is sometimes connected with spasm, inability to move being attributable rather to this, than to loss of power. Occasionally, also, it depends upon a deficient exertion of volition, the patient being capable of moving the limb when excited. This affection may occur in a single limb, or in both; it may even closely imitate *paraplegia*. Sir. B. BRODIE mentions an instance of hysterical paraplegia, which had been improperly treated, before he saw it, by large depletions, &c., and which consequently terminated in sloughing of the nates and in death; the brain and spinal cord were not altered from the healthy state; the thoracic and abdominal viscera were also sound.

36. *b.* When the paralytic state affects internal parts, particularly the digestive canal, it is limited in extent, and conjoined to spasm in its immediate vicinity. It is doubtful, whether or not, the dyspnœa of hysterical subjects may not also depend upon one or other, or rather upon both, of these conditions.—A seemingly paralytic state of the bladder is also met with in young women, especially those who are subject to pains in the loins, pelvis, or hypogastrium; and, like other paralytic affections, is sometimes attended by pain or tenderness in a portion of the spine *Hysterical retention of urine* arises either from temporary paralysis of the muscular coat of the bladder, or from spasm of the neck of this viscus, caused by irritation of adjoining parts. Hysterical females are liable to an excessive secretion of urine from mental emotion; and if imperfectly exerted volition, or other circumstances, allow its accumulation, the bladder soon loses its contractile power, owing to over-distention. — There is every reason to suppose, that many of the most constant and pathognomonic symptoms of hysteria proceed from irregular spasmodic and paralytic states of the muscular coats of the digestive canal, in connection with inflation, propagated from the large bowels to a greater or less extent, and frequently as far as the œsophagus.

37. *c. Aphonia, or loss of voice* is not an uncommon symptom of hysteria. It may occur alone or follow a paroxysm. It is doubtful, however, how far it depends upon deficient muscular power, or upon spasm. It is sometimes associated with hysterical dyspnœa, cough, or the globus hystericus. Occasionally it is accompanied by symptoms indicating chronic laryngitis, or œdema glottidis. In a case of this description, lately under my care, the hysterical character of the affection became developed after the application of leeches.

38. *E. Hysteria may manifest itself chiefly by disorder of the mental emotions and faculties.* — The mental affections connected with hysteria may be referred to one or other of the following: — 1st. To certain states of monomania, amongst which excited desire, amounting in some cases to nymphomania, may be enumerated; — 2d. To *ecstasis* and mental excitement, in some cases of a religious nature, in others of different descriptions; — 3d. To a state of somnambulism; — 4th. To a form of delirium, generally of a lively character, with which various hysterical symptoms are often conjoined; — 5th. To various delusions, generally of a hypochondriacal kind, to which the patient may become subject, or even the victim, owing to the indulgence it may meet with from imprudently kind relatives; and 6th. To a desire to feign various diseases, sometimes of an anomalous or singular form. In all these, the occasional occurrence of hysterical symptoms; complaints of shifting, transitory, or anomalous pains; disorder of the uterine functions; the nervous temperament, and the hysterical state of constitution, will evince the precise nature of the affection.

39. *F.* Irregular or imperfectly developed hysteria not merely assumes one or other of these states, but sometimes presents two or more of them; or the one complaint may succeed the other. Hysteria may even put on certain anomalous appearances, which cannot well be classed or accurately described, but which will be readily recognised by the physician after a careful examination of the uterine functions and of the temperament, habit of body, constitution, occupations, recreations, and modes of living of the patient. Some of these local and simulating complaints, as coma, palsy, delirium, &c., may follow the regularly developed paroxysm in one of the severer forms above described (§ 8—10.); but they as frequently appear as the prominent ailment, and as here mentioned. They may also gradually pass into, or nearly resemble, other nervous or convulsive affections described under the heads of CHOREA, CATALEPSY, CATALEPTIC EXTASY, CONVULSIONS, EPILEPSY, HYPOCHONDRIASIS, &c.

40. IV. HYSTERIA IN MALES?—Numerous writers of great respectability have believed in the occur-

rence of hysteria in males during states of debility. I have never met with a case, however, in which the complaint was unequivocally developed; but I have seen several nervous affections in males of a susceptible and irritable temperament, weakened by disease, or by over-exertion, that have assumed some of the characters of hysteria, particularly in its irregular or undeveloped state. Cases of hypochondriasis and of melancholy in the male, occasionally present somewhat of an hysterical character; thus I have met with an instance of hypochondriasis in a gentleman aged about forty, who complained of painful attacks of priapism, of a feeling of stricture about the throat, with shedding of tears, miserable depression of spirits, &c.; and yet who could readily join in lively and amusing conversation. Such instances serve to show the relation existing between hysteria and hypochondriasis — a circumstance not less deserving attention, than the distinctions between them. Of the facts adduced and alluded to by SYDENHAM, HOFFMANN, WHYTT, FERRIAR, VILLERMAY, GEORGET, and CONOLLY, favouring the opinion as to the occurrence of hysteria in males, the most conclusive is that recorded by Mr. WATSON (*Edin. Med. and Surg. Journ.* vol. xi. p. 303.). A strong man complained of giddiness and headach, and was seized with epileptic convulsions. After some hours, the symptoms returned with alternate laughing and crying, spasms about the throat, and inability to speak, although he was perfectly sensible. Dr. TROTTER states (*Medicina Nautica*, vol. ii.), that hysteric fits occurred in some cases sent to hospital ships, and that they were attended " by violent convulsions, globus, dysphagia, immoderate risibility, weeping and delirium." It is very possible, that unaccustomed continence in the male may, in rare cases, and in the nervous temperament, give rise to seizures of an hysterical nature. I was consulted by a young gentleman, who complained of headach and several of the symptoms of hysteria, after prolonged periods of continence. I recommended him to marry: he adopted my advice. I saw him two or three years afterwards, and he told me he had had no return of the complaint. A similar instance to that adduced by Dr. CONOLLY, and which arose from intense study, occurred to me some years since. I was recently consulted in the case of a young man of the nervous temperament, who had become early addicted to drunkenness, and who relinquished the habit under the guidance of his friends. Soon afterwards, upon the occurrence of a domestic calamity, he was attacked by a nervous complaint, in which it was difficult to determine whether the hypochondriacal or hysterical character predominated.

41. V. COMPLICATED HYSTERIA.—Hysteria may appear, in either its developed or irregular forms, in the course of numerous other diseases. It may occur at the crisis of, or during recovery from, fever or inflammatory diseases; during the progress of, or in early convalescence from, inflammations of the respiratory organs; or in the course of pulmonary consumption. It is sometimes complicated with asthma—*Hysterical Asthma;* and is very generally a symptom of, or associated with, inflammations of the uterus or ovaria, particularly when these take place independently of the puerperal states. It frequently also attends leucorrhœa and structural lesions of these organs. Hysteria may occur during pregnancy; but it is oftener suspended by this state, as well as by lactation, although it sometimes appears a few weeks after delivery. Its frequent connection with irritation of the spinal cord, with functional disorder of the heart, &c., has been already alluded to; and it is often associated with hypochondriasis. It is often also consequent upon derangements of the digestive organs, especially those in which the gastro-intestinal mucus surface is in a state of irritation. It is not infrequently connected with disorder of the urinary organs, the urinary secretion and excretion being affected in various ways, besides that which more usually characterises the hysteric seizure. When hysteria appears in the course of other maladies, it is generally owing to the temperament and constitution of the patient, and to debility or exhaustion of nervous power, from disease or from treatment. Hence its occurrence after excessive or inappropriate depletions, after hæmorrhages, after parturition, and after fevers.

42. When hysteria is complicated with these or other diseases, or when these affect hysterical females, a prolongation of disease, or further complications, and a protraction of convalescence, are frequently produced. Dr. CONOLLY justly remarks, that in the course of a long hysterical disorder, and yet more readily in the course of fever in an hysterical patient, inflammatory action may take place at the origin of previously irritated nerves, or in the brain, or other organs: tenderness of the spine may become excessive; and disordered sensation and impaired power of motion may indicate the existence of something more than mere irritation. These symptoms may disappear as the patient gains strength; but they sometimes become more intense and constant, and assume a more serious form than the shifting, evanescent, or local tenderness and pain, affecting various parts as described above (§ 14.).

43. VI. DURATION AND TERMINATIONS.—*a.* The *duration* of the *paroxysm* of hysteria varies from a few minutes to many hours; but the continuance of the complaint is very uncertain. Hysteria may not again recur after a single seizure, especially if it have been induced by the more powerful causes; but this is seldom the case, for when it has once appeared, there is a predisposition to its return in one or other of its various forms, upon the recurrence of any of the predisposing or exciting causes. Much, however, will depend upon the general health and circumstances of the patient. It may thus re-appear after intervals of various duration; or it may hardly ever be completely absent, in some one or other of its numerous modes, during the greater part of the period between puberty, or the age of twenty, and the complete cessation of the catamenia. It seldom occurs even in those subject to it after this latter epoch: yet I have seen instances of it induced by mental emotion, at a much later period of life. A very large proportion of the ailments of females during the period of uterine activity, however diversified their characters may be, are really hysterical. Hence many females enjoy much better health after this change has been quite completed than they did previously; although about the period of change, their complaints are often aggravated.

44. *b.* The *Terminations* of hysteria are — 1st.

In a more or less complete restoration of health. 2d. In some other complaint, into which it may altogether merge and disappear, or with which it may become associated. It rarely or never terminates in death, unless from neglect or improper treatment. — (*a*) Restoration of health depends very much upon the attention paid during treatment to the removal of the causes, to the state of the general health, to the uterine functions, and to associated disorder. — (*b*) Hysteria may pass into epilepsy, or assume various convulsive forms. It may terminate in mania, and more rarely in confirmed insanity, or in mental imbecility. Females who have been subject to hysteria in the unmarried state, especially if it have assumed the fully developed or convulsive form, are more disposed than others to puerperal convulsions and to puerperal mania; although marriage sometimes entirely removes, or ameliorates the complaint. It may also terminate in inflammation of the membranes of the brain, or of the spinal cord; but this does not occur so frequently as some suppose. It occasionally gives rise to inflammation of the uterus, or of the ovaria; but in these cases, the irritation or congestion of these parts, and disorder of the uterine functions, upon which the hysteria depended or was associated, are only more fully developed, or converted into the inflammatory state by it. Although it often deranges the functions of the heart and lungs, it seldom occasions serious diseases of these organs; but it often aggravates pre-existent disorder of them, as well as of the several digestive viscera.

45. VII. DIAGNOSIS.—It is generally easy to distinguish the more fully developed states of hysteria from other affections; yet this is occasionally very difficult; and it is particularly so to distinguish several of the more irregular forms of the complaint from those diseases which they so closely simulate. Of the *diagnosis* of these forms I have made sufficient mention in my descriptions of them. — *a*. Fully formed hysteria may be mistaken for *epilepsy*, and the mistake is the more likely to occur, as the former may pass into the latter, particularly when affecting plethoric persons, or when neglected; but it then usually assumes the uterine form of epilepsy. PINEL, VILLERMAY, and CONOLLY, have properly insisted on the importance of forming a correct diagnosis between these two maladies, and especially of not imputing epilepsy to a female who is merely hysterical. "It is important to humanity, and to the peace and happiness of families," adds M. VILLERMAY, "that these complaints should be correctly distinguished." Epilepsy is an hereditary disease, is incurable in the majority of instances, and generally weakens the intellects and the understanding — circumstances which cannot be imputed to hysteria. — SYDENHAM, TISSOT, and VILLERMAY advise that not only should the symptoms and mode of attack in both be inquired into, but also the causes which occasioned the seizure: yet too much reliance should not be placed upon these in the formation of a diagnosis. The most frequent causes of *hysteria* are, the emotions of love and jealousy, voluntary or compelled continence, longings after ardently desired objects, or unsated desire, disorders of menstruation, &c. (§ 54.); — those of *epilepsy*, on the other hand, are hereditary predisposition, fright, terror, &c. (See art. EPILEPSY, § 19—24.)

46. In *epilepsy*, the seizure is sudden or instantaneous; the patient often utters a loud cry, falls violently to the ground, froths at the mouth, protrudes the tongue, which is generally injured by the teeth, and is altogether unconscious. The eyes are distorted, the muscles of the face violently convulsed, and the pupils are insensible to light. There are generally no precursory symptoms, and there is no sensation of globus hystericus. The epileptic attack terminates in sopor, or a heavy sleep, from which the patient awakens exhausted, complaining of headach and depression. In *hysteria*, on the other hand, the seizure is more gradual; is generally preceded or attended by the globus; neither frothing at the mouth, nor protrusion of the tongue, nor distortions of the face and eyes characterising it. The hysteric patient retains her consciousness, or remembers what has passed during the paroxysm; and although she laughs and weeps alternately, the muscles of the face are not otherwise convulsed. At the termination of the fit, there is often a tendency to sleep, or rather a desire to remain quiet; but there is no sopor or heavy sleep, unless in the comparatively rare form of hysterical coma. There are always borborygmi, pain in the left side, and a copious flow of urine. M. GEORGET attaches most importance to the absence of the precursory symptoms observed in hysteria, the complete loss of consciousness, and the distortion of the mouth, protrusion of the tongue, and state of the eyes, in determining the existence of epilepsy. When hysteria is about to pass into epilepsy, distortion of the eyes and of the muscles of the face is the surest indication of the transition; and when to this, frothing at the mouth, injury of the tongue, and complete loss of consciousness are added, the epileptic character is fully developed. Numerous other circumstances connected with the history of the case, and the occurrence of the attack, already stated in the description of both diseases, will assist the diagnosis. When a convulsive paroxysm occurs in males, there can be rarely any doubt as to its nature; but when it appears in females, an attentive inquiry into its peculiarities, and into the state of the uterine functions, is especially requisite; for, although it may be hysterical, it may pass into the epileptic form, or it may present a mixed character, but attention to the pathognomonic symptoms just stated, will readily determine the nature of the seizure.

47. *b*. Although *hypochondriasis* and hysteria are distinct diseases, yet they frequently approximate each other, or are even associated in females; indeed, most hysterical females may be said to be hypochondriacal, especially if hysteria has become habitual or confirmed. Dr. CULLEN remarks, that the two diseases have some symptoms in common; but they are for the most part considerably different. Spasmodic disorder is rare in the one, but frequent unto a great degree in the other. Persons liable to hysteria are sometimes affected at the same time with dyspepsia: they are often, however, entirely free from it; but this never happens to those subject to hypochondriasis. These complaints occur mostly in different temperaments, ages, and sexes; a circumstance requiring no illustration. The association of them in the female, and perhaps in rare instances in the male, as in the cases above alluded to (§ 40.), is of too much importance to be overlooked. Considering how

much the several parts of the body are connected, and how much the several functions depend upon each other, we cannot wonder that their morbid affections should often be mixed, or insensibly pass, the one into the other; the effect of this is indeed that there are no universal distinctions, and that in a few cases only are there exact limits between analogous or similar diseases. Accurate observation and precise description do much in extricating us from this confusion; but in some cases still, we must remain in doubt and in difficulty. Yet even in these, it will matter but little as to what name we may use, so long as we recognize and estimate with accuracy the nature, extent, and relations of the morbid condition.*

48. VIII. CAUSES.— i. *Predisposing.*—Hysteria may be said to be almost peculiar to the *female* sex; for the instances of its appearance in the male are so rare, and so problematical, as respects its fully developed and convulsive states, as hardly to be taken into account. — *a.* The *age* at which females are most liable to it is from fifteen to fifty; and especially from twenty to thirty, and again from forty-two to forty-eight. It sometimes does not occur until the latter epoch; but it rarely recurs at a later period of life. Hysteria is very seldom observed before puberty; but considering that menstruation commences in some cases, particularly in young ladies in boarding-schools, as early as the tenth and eleventh years, the appearance of this complaint, in some one or other of its forms equally early, cannot be a matter of surprise. — *Temperament* and *diathesis* evidently predispose to hysteria;— nervous, sanguineo-nervous, and irritable temperaments, and persons of a lax, weak, or delicate, impressible and soft habit of body are most subject to it. As this state of constitution is derived from the parents, the opinion of HOFFMANN, FRANK, and others, as to its occasional dependence on hereditary predisposition, cannot be disputed. The children of debilitated, exhausted, or aged parents, and those who are of an impaired constitution, either originally or from early management and education, are most likely to be subject to this disorder. — A plethoric *habit* of body, joined to relaxation or deficient tone, predisposes to the more developed or convulsive states; and a thin or spare habit, associated with delicacy of conformation and susceptibility of the nervous system, to the more irregular forms.

49. *b.* There is perhaps no other malady, which depends so much as this upon the *management* of childhood, and on the moral and physical *education* of early life. A luxurious and delicate mode of living, and of rearing; a neglect of whatever promotes the powers of the constitution, especially of suitable exercise in the open air, and of early hours as to sleeping and rising; an over-refined mode of education, and the excitement of the imagination and of the emotions, to the neglect of the intellectual powers and moral sentiments; too great devotion to music, and the perusal of exciting novels; the various means by which the feelings are awakened, and acute sensibility is promoted, whilst every manifestation of either is carefully concealed; and studied endeavours to dissemble desires which struggle to be expressed, — all serve, especially at a period when the powers of mind, and the conformation of the body are approaching development, to produce that state of the nervous system, of which hysteria is one of the most frequent indications. About the period of puberty in females, various circumstances connected with their education tend to weaken their constitution, to excite their emotions and desires, and to cultivate their imaginative and more artificial faculties, at the expence of their reasoning and moral powers Whenever numbers associate previous to, or about the period of puberty, and especially where several use the same sleeping apartment, and are submitted to a luxurious and over-refined mode of education, some will manifest a precocious development of both mind and body; but in proportion to precocity will tone and energy be deficient, and susceptibility and sensibility increased. In these circumstances also, organic sensibility, particularly as relates to the uterine system, often assumes a predominance powerfully predisposing to hysterical affections. There can be no question, although the subject has been but rarely approached by British medical writers, that indulgence in solitary vices and sexual excitements, is not an infrequent cause of this, as well as of other disorders. Numerous writers have insisted upon the propriety of giving due consideration to this source of mischief, as well as to the ennui and chagrin attending celibacy and continence. I agree with Dr. CONOLLY, in believing that English practitioners pay perhaps too little attention to these and other related circumstances; and that, in a country where the passions and emotions are so carefully suppressed, or concealed, they sometimes seem to forget their silent operation on the frame, and charge the medical writers of other countries with being somewhat fanciful and extravagant.

50. *c.* Besides the above, there are various circumstances connected with the *social state*, that tend to develope these conditions of the uterine organs and nervous system, in which hysterical disorder originates. M. GEORGET remarks, that the progressive steps of life, as youth passes away, are sources of painful moral affections, especially to the frivolous, the vain, and the unmarried of the sex. These affections increase the susceptibility of the nervous system, and, with numerous other circumstances yet to be mentioned, dispose to the nervous disorders of the more advanced epochs of life. There can be no doubt, that pampered modes of living; an early or habitual indulgence of temper, or of the emotions and desires; the use of wines and liqueurs, even within what may appear the bounds of moderation; late hours, and late rising; insufficient modes of exercise, or the want of it, and of pure air; neglect of the requisite exposure to light and

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* M. BRACHET, in distinguishing between hysteria and hypochondriasis, says that the former is a spasmodic affection of the cerebral nervous system, to which he has given the name of *cerebral neurospasm* (*neurospasmie cérébrale*), and that the latter is a disorder, a vitiation, an aberration of the two nervous systems, which he denominates a *cerebro-ganglial neurotaxy* (*neurotaxie cérébro-ganglionaire*). Thence he infers that there can be no identity as to seat or affection between these two diseases; for the one is a spasmodic affection of the cerebral system only, and the other is an ataxy of the two nervous systems. He moreover states that there is no farther analogy between them, than the participation of the cerebral nervous system in the two maladies; but that, in hypochondriasis, the ganglial system is equally compromised. Hence, 1st. They are not identical affections: — 2d. They differ in their seat and nature; the phenomena in the one being spasmodic; in the other, vitiation of function.

sunshine; and sedentary occupations, particularly in over-heated and crowded apartments or factories, more or less predispose the female constitution to this affection. Some writers believe that the use of tea and coffee has a similar effect; it is possible that the former, especially green tea, taken too frequently or in excess, will weaken the nervous system; and that the latter will sometimes excite the uterine organs. The influence of *climate* is not very manifest; temperate and changeable regions certainly furnish more numerous instances of nervous disorder in females, than very warm or very cold countries; but as much is probably owing to the state of *manners* and *society* in the former, as to climate. Even *dress* has some effect in the production of hysteria; inordinate compression of the waist by stays not only weakens and displaces the digestive organs, but favours local determinations and congestions, and deranges the uterine functions.

51. *d. Previous disorder* more frequently predisposes to hysteria, than other circumstances, for many of those already noticed induce other complaints, before hysteria, in any of its forms, is manifested; and these complaints constitute merely that state of predisposition, which only requires the occasion or exciting cause of its appearance. The various disorders of MENSTRUATION (see that article), determination of blood to, or congestion, or irritation of any of the uterine organs, may exist, and yet no hysterical affection take place. The nervous system also, both ganglial and cerebro-spinal, may be susceptible and morbidly sensible, and yet none of the phenomena constituting hysteria may appear. These, as well as some other morbid states, frequently constitute only the predisposition, which, however, will readily burst into open disease, when one or more of the exciting causes come into operation. Whatever exhausts organic nervous power will increase susceptibility and irritability, and thus constitute that mobility of the system, and disposition to local determinations and congestions, justly insisted upon by Dr. CULLEN, as being connected with the pathology of the complaint. The susceptibility arising from exhaustion by acute disease favours the appearance of hysteria, especially during early convalescence. The approach and presence of the catamenia have also some influence, both as a predisposing and an exciting cause.

52. *Gastro-intestinal disorder*, or irritation, has been justly viewed by numerous writers, as a predisposing cause of hysteria, and particularly insisted upon by BROUSSAIS and his followers. Although this writer has doubtless exaggerated the influence of this morbid condition, and imputed to it phenomena depending chiefly on debility and augmented organic nervous sensibility, yet it is nevertheless often present, associated, however, with other morbid states, as those just named, and with impaired action and flatulent distention of the digestive canal. In some cases also, the gastro-intestinal disorder is almost coeval with, and purely a complication of, the hysterical affection. But it is much more frequently observed, that numerous circumstances tending to disorder the digestive mucous surface, especially errors in diet, as respects both food and drink, and various symptoms indicating impaired or disordered digestion and fæcation, have preceded for a longer or shorter period the development of the hysterical disorder. Still it must be admitted, that the symptoms referred to the alimentary canal, especially impaired function, flatulent distention and borborygmi, and altered sensibility, are greater indications of debility of the organic nervous system, than of inflammatory irritation of the gastro-intestinal mucous membrane. Nor should it be overlooked, that disorder of the uterine organs, seated not merely in the nerves, but affecting also vascular action in these organs, may exist without exciting painful sensations, and yet sympathetically disturb the digestive canal. Thus we perceive the changes produced in the uterine system by impregnation displayed chiefly in the digestive organs and nervous system. Even the errors of diet, and the desire for various improper or indigestible articles of food and drink, which has been attributed to disorder of the alimentary canal, may be actually occasioned by changes originating in the uterine organs. These substances, however, by increasing the disorder of the digestive tube, will aggravate or perpetuate the primary affection of the sexual organs. There can be no doubt, that whatever weakens organic nervous power, as all disorders of the gastro-intestinal viscera necessarily do, will both dispose to, and increase, hysterical complaints.

53. It has been supposed by some writers, that the females of *gouty* parents are more prone than others to hysteria. This may be partly accounted for, by deficiency of constitutional energy derived from the parent, and greater susceptibility of the nervous system, as well as by the circumstances alluded to above (§ 49.).

54. ii. *Exciting Causes.* — Certain of the predisposing causes may of themselves occasion the complaint, when more than usually active, especially disorder of the uterine organs, or of the digestive canal. Excitement of the nerves of the uterus or ovaria, or irritation of them, particularly in connection with any irregularity of menstruation; inflammatory action, of an acute, subacute, or chronic nature, of the vagina, or of these organs; congestion, structural lesion, tumours, polypi, &c., of the uterus, and leucorrhœa, not infrequently occasion hysteria. Although this disorder is very often connected with excitement, or even with inflammatory irritation in the ovaria, yet it is seldom symptomatic of fully developed ovarian dropsy. It is not improbable, that this latter malady proceeds from a state of impaired tone, or is associated with a condition of the organic actions in these parts, incompatible with the production of the hysterical paroxysm. Irritation of the gastro-intestinal mucous membrane, by stimulating or acrid ingesta, particularly such as act upon the colon and rectum, as large doses of aloes, colocynth, &c.; morbid secretions, mucous sordes, and fæcal collections in the large bowels; the irritation of worms, especially of ascarides, in the rectum—the *Hysteria verminosa* of SAUVAGES; the use of stimulating or acrid glysters; and hæmorrhoids, sometimes excite one or other of the forms of the complaint. Excessive discharges and hæmorrhages, particularly prolonged leucorrhœa, diarrhœa, abortions, uterine hæmorrhage, and protracted suckling, on the one hand; and on the other, the suppression of discharges, as of the catamenia, of the lochia, and of leucorrhœa; long or extreme suffering from pain; mental or bodily

fatigue; and even irritation of remote parts, as that connected with cutting the wisdom teeth, occasionally induce a seizure.

55. Mental affections and excitements, especially those which act upon the uterine system in particular, disappointments in love, unreturned and spurned affections, jealousy, anger and other violent emotions; protracted expectation, longings after objects of desire, tragic representations, frights, the sight of objects, disgusting or distressing, or disagreeable from peculiar mental diathesis, and intelligence of a distressing or of an exciting nature, suddenly communicated, are the most common occasions of hysteria, as respects both its first appearance, and its subsequent recurrences. Several of these emotions affect the uterine organs, the affection being afterwards reflected upon the nervous system generally. Premature or physically incongruous marriages; excited, but unsatisfied, desires; celibacy, and veneris desiderium inane, are also not infrequent causes of the complaint. Frank remarks, that "Cœlibem vitam plures sine noxâ ducere possunt fœminæ, sed vix unam illarum invenies, quæ prope maritum impotentem impune decumbere possit. Idem de uxoribus, a maritis neglectis, valet."— There is no doubt, that the sight of others in the fit will sometimes produce an hysterical seizure. I have myself witnessed this on two or three occasions; and in one of these, two females were attacked from this circumstance. This phenomenon has been imputed to imitation; but it may with equal propriety be assigned to sympathy, to fear, &c. Probably more than one of these feelings are concerned in producing it. Severe mental distresses, or extreme joy, may also occasion some one or other of the forms of the complaint. Immoderate fits of laughing produced by humorous or ridiculous occurrences, or crying caused by vexation or contrarieties, may also pass into the hysterical paroxysm. I have no doubt of the fit being often renewed at pleasure, almost as readily as tears may be shed, by recalling or adverting to various feelings, emotions, or circumstances; and I have even seen instances which have convinced me of the fact. Electrical and warm states of the air, and sudden vicissitudes of temperature, have been supposed sufficient to produce a seizure. The influence of spirituous or vinous potations, of stimulating diuretics, and of substances which excite or irritate the urinary bladder, in the production of the complaint, is much less doubtful than that of atmospheric temperature; but the close, warm, and impure air of crowded rooms and assemblies, particularly in connection with excited feelings or contrarieties, very often occasions an attack, especially in those who have previously experienced it. A similar effect is in rarer instances produced by various odours, especially in peculiar idiosyncracies. Highmore states that the fit has been often induced by the odour of musk.

56. IX. Pathology.— The nature of hysteria may be in a great measure inferred from what has already been stated respecting its symptoms and causes; yet something more explicit still must be advanced on this subject. As simple and pure hysteria is rarely or almost never fatal, and as we therefore have hardly ever an opportunity of examining the state of the principal viscera of patients who had been subject to this complaint, unless they have died of some intercurrent or associated malady, so proofs have been wanting in support of any of the doctrines proposed as to its nature, and a very wide scope allowed for vague hypothesis. The ancients and many of the moderns referred hysteria to the womb; and hence the origin of the name. The ancients, however, ascribed properties, powers, functions, and motions to the uterus, which modern knowledge has shown to be erroneous; yet I am disposed to believe that this organ, influenced as it most probably is by the nervous and vascular states of the ovaria, performs a very important part in the œconomy; and that this is not confined to alterations merely of its organic sensibility, but that it extends frequently to its contractility, and to several related organs.

57. Some recent writers have ascribed hysteria to irritation in the uterus, in the intestines, in the brain, or even in other internal viscera, occurring in delicate, nervous, or susceptible persons. Dr. Conolly remarks, that in all cases of hysteria there is a disordered state of some part or the whole of the nervous system; and that, although this state may be, and very frequently is, induced by uterine irritation, it no less evidently arises, in other cases, from causes productive of irritation in other parts of the body, and also from causes acting directly upon the mind. That more or less susceptibility, original or acquired, characterises the state of the nervous system in hysterical persons will not be disputed; yet even in such persons, the usual exciting causes, or irritations of different viscera, will not occasion true hysterical symptoms, unless they previously affect the state of organic nervous influence, or of circulation, in the sexual organs.

58. Willis ascribed hysteria to disorder of the brain, and M. Georget has recently adopted the same view, which has been most ably and satisfactorily overthrown by M. Foville. Still more recently Mr. Tate has contended that hysteria arises from a morbid state of the spinal cord, connected with disorder of the womb; but, as I have already remarked, this "morbid state" is but a vague generic term, and that, most probably, even when it is most prominent, more of altered sensibility than of vascular or structural lesion, of this part of the nervous system constitutes its essence. However this may be, attentive observation of the morbid phenomena, especially at their commencement, will show that the spinal affection is merely a consecutive and contingent disorder, and one by no means generally, or even very frequently, observed. This want of precision in the use of terms, and in the ideas relating to the pathology of hysteria has been surpassed by M. Andral, when he says, "As to my opinion respecting the seat of hysteria, I repeat, that it is a nervous complaint, and that its seat is the nervous system!"

59. Although the uterus and its appendages have been viewed as the chief source of hysteria, both by the ancients, and by most of the moderns, yet some difference of opinion exists as to the nature of this primary affection. Pinel, Villermay, Lobstein, and Foville consider that it is entirely nervous, or is an excited state of the nerves supplying the organs of generation. Other writers, as Addison, &c., who have adopted the term uterine irritation, seem to ascribe to this

term a similar meaning to that which the above authors have wished to convey; although they contend, that, in connection with this state, the uterine functions are very often disordered. M. Pujol, on the other hand, infers the existence of chronic inflammatory action of the uterus, as the immediate cause of the complaint. Inflammatory action in its various grades, from simple erethysm upwards to the most acute vascular change, may sometimes be a complication or cause of hysteria; but there is no necessery dependence of the one upon the other; for we often meet with *metritis*, without hysterical symptoms, and still more frequently with fully developed hysteria, without any evidence of metritis. Yet it should not be overlooked that the former is often symptomatic of, or complicated with, the latter.

60. When we consider the number and importance of the nerves of the female organs of generation; the connections existing between them and the nerves supplying the kidneys, the urinary bladder, and the intestinal canal on the one hand, and the spinal and sacral nerves on the other; and the fact that these nerves are small and apparently few in girls, large and numerous during the epoch of uterine activity, and very small in old women; the sympathetic effects of irritation, excitement, or of erethysm of them will be more readily recognised, and the relation of these sympathies to their source made more obvious. Attentive observation of the causes of hysteria, and of their more immediate effects upon the generative system, and a knowledge of the sensations of the patient with reference to the origin and course of this ailment, will prove, that the old opinion as to its source is correct. That the primary affection is seated in the nerves of the generative organs, and that it consists chiefly of excitement, erethysm, or irritation, sometimes, however, associated with congestion or vascular determination to the uterus, or with disorder of the catamenia, are shown by the circumstances in which it is observed, and the fact that it never appears until these nerves have approached their full development, nor after their principal functions have ceased. Georget, however, contends in opposition to this opinion, that organic lesions of the uterine organs are very common in females, who have never had hysteria; and that the more serious changes, as cancer uteri, uterine polypi, ovarian dropsy, &c., are seldom accompanied with this complaint. But the most of these maladies do not appear during the epoch, in which hysteria is most common. As long as the uterine functions and sympathies are active, hysteria will occur. Hence its not infrequent connection with metritis and other uterine diseases, during the prime of life; but when these functions and sympathies are exhausted or greatly enfeebled, as in most of the dangerous maladies and organic lesions of the uterus and ovaria, as well as in advanced life, hysteria will not be developed. The generative nerves have then become incapable of experiencing that state, and of exerting that influence upon the nerves related to them, which are requisite to the production of hysterical phenomena. As M. Foville has justly observed, we do not find sexual ardour amongst the symptoms of malignant alterations of the testes, or of hydatids in the spermatic cord, &c. Hysteria does not occur in aged females, for the very same reason that menstruation and pregnancy do not take place in them. The belief that hysteria may affect males has been adduced against its uterine origin; but the fact of true or unequivocal hysteria having been met with in males, needs further confirmation; or rather the nervous affections, resembling some states of hysteria, noticed in this sex, require a closer observation than they have hitherto received. I will not, however, deny, that irritation of the male sexual organs will not occasionally produce disorder, in many respects similar to that observed in females in like circumstances, particularly in susceptible and nervous persons.

61. My views, therefore, as to the *pathology of hysteria* are as follows: — *a*. That hysteria arises from the state of the organic nervous influence endowing the generative organs of the female, and that a similar state of the sexual organs of the male very rarely occasions it, and then only in peculiar circumstances; — *b*. That this state of nervous influence nearly approaches to, or consists of, excitement, nervous erethysm or irritation, or is of an active or sthenic kind, as respects the functions of these organs; — *c*. That this is generally attended by vital turgescence of the vessels of the uterine system; and these states, consequently, occur chiefly during the prime of life, or whilst the nerves of generation and the uterine circulation possess their functional energies; — *d*. That these conditions of nervous influence and circulation in these organs are generally insufficient of themselves to occasion the fully developed complaint; and that, in addition, there are increased sensibility and irritability of the sentient and motive systems, and consequently augmented susceptibility of impressions, from mental or physical causes, arising either from original conformation, or from acquired habit or diathesis; — *e*. That when these states of the generative organs are excited by mental emotions or by other circumstances, the affection is propagated by direct or immediate sympathy, — by the organic nerves, — to the digestive tube and urinary organs on the one hand, and to the cerebro-spinal nervous system on the other; and thus the phenomena constituting the hysterical seizure are developed; — *f*. That the hysterical phenomena, proceeding from *direct sympathy* with the uterine organs, consist chiefly of those referred to the bowels — the borborygmi, globus, &c., and to the urinary organs, as the increased secretion of urine, &c.; — *g*. That the extension of the disorder of the uterine nerves, by means of the ganglial system and its communicating branches, to the roots of the spinal nerves, gives rise to the symptoms depending upon *reflex sympathy* *, especially the convulsions, pains, &c., and the affections of the respiratory organs, throat, head, &c.; — *h*. That the phenomena of the developed states of the disease and of its irregular forms are principally sym-

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* In my Appendix *to* M. Richerand's *Elements of Physiology*, published in 1824 and in 1829, I have divided the sympathies into — 1st. The *Reflex*, or those which take place in consequence of irritations conveyed by the nerves to the cerebro-spinal centres, and thence reflected upon motive or sentient parts: — and, 2dly. The *Direct*, or those which proceed more immediately from the seat of primary excitement to other parts, by means chiefly of nervous communication, continuity of membrane, structure, &c. — These views as to sympathy, which are certainly original, were applied to the explanation of the pathology of Chorea, and its related disorders of Convulsions, Epilepsy, &c.

pathetic, and of the kind which I was the first to denominate the *reflex* (see *Notes and Appendix to* RICHERAND's *Elements of Physiology*, pp. 34. and 546.); and the same views and pathological explanations given in the articles CHOREA AND RELATED AFFECTIONS (§ 15—17.), CONVULSIONS (§ 46.), EPILEPSY (§ 51.), apply to the different varieties of HYSTERIA; — *i.* That, although hysteria is often connected with deficient or irregular menstruation, yet this function is sometimes excessive, or is occasionally regular, in every respect, in hysterical persons.

62. X. TREATMENT. — There are few diseases less under the control of medical treatment than hysteria; and various circumstances connected with it often occur to render the management of it not only unsatisfactory, but also unpleasant. Patients themselves or their friends readily suppose that relief should quickly follow a recourse to medicine, and conclude, that the proper means have not been employed, when relief is not obtained. They do not consider, — and the fact is generally not sufficiently explained in the proper quarter, and at the proper time, — that the complaint arises from causes which are mostly permanent in their action, or which continue during the treatment, and that in every case the difficulty of removing an effect, whilst the causes are in operation, is very great. The candid physician also readily admits, that the complaint in its various forms is devoid of danger, and this circumstance is believed by many to imply a speedy cure. Several varieties of it also are calculated to excite alarm; and, if they be not soon removed, the knowledge or ability of the physician, under whose care they may have come, is impeached; and some other advice is asked, and often in quarters noted neither for honesty nor ability. If the patient should thus fall into the hands of either the qualified or the unqualified charlatan, the complaint is misrepresented or exaggerated, and alarm is excited. The effect, however, is often beneficial, although it was as little intended as its source was unsuspected. The impression of fear on the mind may put a stop to some of the causes, or may interrupt the succession of morbid sympathies. The patient, moreover, after she has passed from the care of the scientific practitioner, may be subjected to influences of a powerful nature, moral or physical, or both, and experience temporary or some permanent advantages from them; but from whatever source they proceed, or by whomsoever administered, — whether by the medical empiric, or by the spiritual comforter — the modern worker of miracles, — the results are often equally annoying to the duly qualified practitioner. The regular professor of medicine is expected to administer benefit in all cases, and without regard to circumstances. If he fail, and the patient, under very different circumstances and influenced by very different feelings, receive benefit from the manipulations of a charlatan, whose means are more striking or imposing, or more suited to the moral condition of the patient, than those previously employed, the occurrence is made a matter of notoriety, and equally to the disadvantage of the one, as to the credit of the other. The former is expected by the public to cure, and it is considered discreditable for him to fail; the latter is viewed as having made a wonderful discovery, if he succeed but in a single case, and his knowledge is supposed to have come by inspiration, as it could not have been derived from any other source. Another circumstance further serves to counteract the treatment advised by scientific men, particularly in large towns. The patient is capricious, and her friends are often equally unstable. If benefit is not received in a very short time, the advice of some one else is obtained, and before he can be of any service, he also is dismissed, and a third is called in. Thus, from twenty to thirty practitioners may be consulted without one of them having had a sufficient opportunity of fulfilling a single intention of cure. Now, what is the consequence? The patient resorts to some noted or fashionable empiric, who is informed of her long sufferings, and the want of success of the greatest physicians in her case. He is shrewd enough to see at once the state of matters, and to turn them both to his pecuniary advantage and to his credit. He exaggerates the risk, the difficulty, and the consequences of the disease; refuses to undertake the case, unless at his own terms, which he takes care to secure; and he thus also secures the continuance of the patient under his care, and even her confidence, although he should fail in all beside.

63. From the dishonest acts of charlatans, useful lessons may, however, be honestly learnt. When a physician is called to a nervous patient, who has been under the care of other physicians, instead of prescribing at once, and without reference to this circumstance, he should acquaint her or her friends, that probably a sufficient opportunity of affording relief had not been allowed to those who had preceded him; that, as a member of an honourable profession, he expects to be honourably dealt with, and that he will not compromise his reputation by prescribing for the case, unless he be allowed time and opportunity — fully and circumstantially — for its proper treatment. Unless these be conceded, and in a spirit which will promise to secure their due performance, it will be infinitely better to relinquish the case altogether, than to enter upon the treatment of it, with the probability of disappointment. When it is found that the physician thus regards his own reputation, respect and confidence will be accorded to him by the patient and her friends.

64. There are various circumstances in the pathology of hysteria, which require strict attention in the treatment. — 1st. The particular form of the hysterical seizure, whether regular, irregular, or anomalous; — 2d. The condition of the nervous system, particularly with reference to increased sensibility and irritability; — 3d. The excitement, erethysm, vital turgescence, or other disorder of the uterine system, and their influence by *direct* and *reflex sympathy*; — 4th. The states of the vascular system, in connection with these, especially in respect of *plethora*, general or local, or of deficiency of blood; — and, 5th. The functional or other disorder of the digestive canal. Of all these, the most important is the state of uterine function; for unless the symptoms connected with the generative organs be carefully ascertained, as far as is proper to inquire, and the disorder in this quarter be carefully inferred, the treatment will often be unsuccessful; and, even with the utmost exercise of professional acumen, we may fail, more or less, owing to the permanence of the moral and physical causes of the complaint.

65. i. Treatment in the Seizure. — *A.* If the paroxysm be attended by severe *convulsions*, the principal intention is, *to preserve the patient from injuring herself*; the next is, *to shorten its duration.* — *a.* Although her struggles are severe, she generally retains sufficient consciousness and even volition, to avoid danger. Therefore little effort should be made to restrain them, and especially as they have upon the whole a beneficial effect, particularly in equalising the circulation. If, however, the fit assumes an epileptic character, this object should be carefully attended to, and a folded napkin placed between the teeth, if it be required. In all cases, the patient should be removed to an airy apartment, and the clothes loosened around the waist, chest, and neck. — *b.* In order to *shorten the fit*, various means have been recommended, and found more or less serviceable. If the patient is able to swallow fluids, a large cup full of *cold or iced water* may be given and repeated. If the seizure be more severe, or be attended by general or cerebral plethora, the *affusion of cold water* on the head and neck should be resorted to, or cloths wet with it, or with an evaporating lotion, should be placed around the head. If the severity of the spasms, particularly of the muscles of the face and jaws, and of the strangulating sensation arising from the globus, prevents deglutition, *enemata* will be found of great service. The substances which I have found most efficacious, when thus employed, are, the spirits of *turpentine* alone, or with castor or olive oil, *assafœtida*, and *camphor*. An enema of the coldest spring water also puts an instant stop to the convulsions. The spirit of turpentine was recommended by me in 1821 (*Med. and Phys. Journ.* vol. xlvi. p.107.185.), in these cases. From half an ounce to an ounce and a half of it, may be thus administered, with either of the oils just named, in any vehicle, as gruel, milk, broth, &c. As the patient's consciousness is seldom lost in the seizure, the influence of fear in arresting it has been often resorted to, and frequently with complete success. Even mention of the affusion of cold water has put a stop to the fit. Yet instances have occurred in timid persons of great nervous susceptibility, where fear has aggravated the convulsions.

66. *B.* Where there is neither cerebral plethora nor difficult deglutition, the internal use of *diffusible stimulants*, as the preparations of *æther*, of *ammonia*, of *valerian*, of *assafœtida*, &c., have been very generally recommended, and are often useful, combined, according to circumstances, with one another, or with *anodynes*, as *laudanum*, *henbane*, *hydrocyanic acid*, &c.; the smoke of burnt feathers, and the odour of assafœtida, of mint, of the volatile alkali, of aromatic vinegar, &c., are the common domestic means for the removal and prevention of a seizure. Much, however, particularly as respects the *prevention* of the fit, depends upon the patient herself. Most females, subject to the complaint, give way to the current of their feelings, until the paroxysm is developed, although a determined resolution to prevent or suppress it would often prove successful. Diffusible stimulants are not so generally useful in preventing, as in shortening, the attack. The former of these objects is more certainly obtained by a draught of cold water, or by an enema of the same, or by cold applications to the head, than by other means. Dr. Conolly states that he has found half a drachm of ipecacuanha prevent the seizure. Any of the other substances already recommended to be used in enemata, for the purpose of shortening the fit, will generally also prevent it.

67. *C.* The more severe or alarming states of the fit, as the comatose, the cataleptic, &c., are most benefited by the affusion of cold water on the head, or by the application of cold lotions in this quarter. Vascular *depletions* are seldom necessary during the fit, even in these cases, unless the attack has followed the suppression of accustomed discharges; or the temperature of the head, and the action of the carotids show the propriety of prescribing them, and even then a moderate bloodletting, or cupping on the nape of the neck, will be sufficient. Warm and rubefacient *pediluvia*, and other *derivatives* from the head, may also be employed in these cases. The means which may be further resorted to will be stated hereafter (§ 71. 75. 97.).

68. ii. General Treatment, particularly in the Intervals. — *A. With reference to the state of the uterine system.* — The female organs of generation may be subject to that state of excitement, erethysm, turgescence, or irritation, which, in susceptible and nervous persons, seems intimately connected with hysteria, without the catamenia being in any way disordered. More commonly, however, this discharge is scanty, difficult, painful, or irregular as to time, quantity, and character. In a few instances it is suppressed, or nearly so; in others it takes place at intervals of two or three months; in some it is too profuse, or much too frequent, and in many it is pale and branniform, or it presents appearances more fully described in the article Menstruation. But all these states are usually accompanied by more or less of altered sensibility, referrible to the uterus or ovaria: there is often pain behind or above the pubis, in the lower part of the sacrum, or in the loins, or in the hips or tops of the thighs; the excretion of urine is disturbed, or too frequent, or attended by slight scalding, &c.; and there is sometimes leucorrhœa, with tenderness of the os uteri on examination, and occasionally an unpleasant sense of heat in the vagina. All these indicate the propriety of having recourse to local depletions; yet, unless the patient be plethoric, or the discharge has been scanty or suppressed, a very copious vascular depletion is often injurious. A moderate *cupping* on the sacrum; or the application of ten or twelve *leeches* to the groins, two or three days before the expected return of each monthly evacuation, or to the hypogastrium, will generally suffice. If the depletion be more liberal, the employment of tonics and of other means to improve the general health must not be neglected.

69. All the symptoms just noticed as indicating irritation of the uterus, are often present, even in the severest form, where there is great constitutional debility, and, in a few instances, where the colour of the surface and of the lips, and the states of the pulse and of the veins, indicate more or less anæmia. In these, even local depletions may be hurtful. The chief dependence must therefore be placed in preventing local excitement or irritation, in the use of cooling *tonics* sometimes in conjunction with *anodynes* and *sedatives*; and in improving the digestive functions and general health, by

suitable diet and regimen. The *sulphates of iron*, of *zinc*, and of *quinine*, are severally of use, in combination with small doses of *camphor*, or of *ipecacuanha*, and with *extract of henbane*, or of *hop*. If these should occasion headach, or increase the tenderness in the vicinity of the uterus, the *infusion* or *decoction of cinchona*, or the *infusion of valerian* with *nitrate of potash*, or *hydrochlorate of ammonia*, or carbonate of *soda*, may be prescribed. When the bowels require to be opened, the *cooling aperients*, as the bitartrate of potash, with the nitrate, and the confection of senna, should be preferred. Moral and physical *quietude*, frequent reclining on a couch, and a digestible and cooling diet, ought also to be enforced. In more plethoric persons, these means are still more requisite than in the preceding; and, instead of chalybeates and tonics, *cooling diaphoretics*, particularly weak camphor mixture, with solution of the acetate of ammonia, nitrate of potash, and spirits of nitric æther, will be often taken with benefit. Wherever uterine turgescence or erethysm is inferred, the treatment must be directed with reference to the states of general or local plethora, and of nervous power, as hereafter insisted upon; and hot spices, exciting articles of food, and stimulating beverages, should be avoided. Heating purgatives and irritating injections ought not to be employed. A separate sleeping apartment should be suggested.

70. When the catamenia are disordered, the treatment must be directed with strict reference to the state of disorder, as explained in the article Menstruation. If they be *excessive* or *too frequent*, *tonics* and *astringents*, with *refrigerants*, and *anodynes* or *narcotics*, are generally requisite; but the predominant use of either of these classes of remedies should depend upon the peculiarities of the case In these cases especially, advantage will accrue from *cold sponging* the loins, abdomen, and hips, every morning with an *astringent lotion*, as with equal parts of rose water, solution of the acetate of ammonia, and vinegar; from the occasional recourse to an *enema of cold water*, particularly when a seizure is threatened, or to *emollient* and *anodyne enemata* on other occasions; and from rest in the horizontal posture. The *cold plunge* or *salt-water bath*, or *shower bath*, will often also be of service. In the other states of disordered menstruation, the treatment should be directed according to the principles stated above (§ 68, 69.).

71. *B. With reference to the state of nervous susceptibility and tone.* — The increased susceptibility of the nervous system generally characteristic of hysteria is frequently associated with more or less debility, and increased irritability of the moving fibre, — or in other words, with mobility of the muscular system; and to this state, whatever may be other morbid conditions, should the treatment be in some measure directed. Yet the means which are the best calculated to correct this state are by no means obvious: for if it be associated with vascular turgescence of the uterine system, or with general plethora, antispasmodies, chalybeates, and other heating tonics may increase the complaint, although they will generally be of service in an opposite state of the vascular system. In general, therefore, the condition of the sensibility and irritability should be combated chiefly by frequent and *regular exercise* in the open air, by *early rising*, by sleeping in large airy apartments, by cold or *salt-water bathing* or the *shower bath*, by cold sponging the surface of the body, by a proper conduct and employment of the mind, and by a correct management of the passions.

72. Dr. Cullen very justly remarks, that *tonics* may be of service when the disease depends upon general debility; but as a plethoric state, especially of the uterus, is more or less joined with hysteria, the frequent or long continued use of them may do harm. They should be confined to cases of pure mobility, particularly with a periodical recurrence of the seizure; and then the selection of them ought to be determined by the peculiarities of the case. In many such, the preparations of *cinchona* or of *valerian*, with the nitrate of potash, or carbonate of soda; the sulphate of *quinine* or of *zinc*, with small doses of *camphor*; the infusion of *bark*, or of *roses*, with one of the *mineral acids*, and the tincture of the *sesquichloride of iron*, will be most serviceable. In some cases, the addition, to either of these medicines, of an *antispasmodic*, as of the compound spirit of *sulphuric æther*, the *tincture* of *valerian*, &c.; and of an *anodyne*, as henbane, hydrocyanic acid, &c., according to the other substances selected, will be further advantageous. When hysteria affects plethoric habits, and is connected with manifest signs of turgescence of the generative organs, *opium* is injurious. But, in other circumstances, it is often of service, particularly when conjoined with camphor, aromatics, or with some of the substances just named, but even then it should only be occasionally employed. When narcotics have not been previously resorted to, the preparations of *hop* will be found useful, if general plethora be not present.

73. *C. With reference to the states of the vascular system.* — The connection of hysteria with vascular plethora, general or local, is often obvious; and has been very judiciously viewed by Dr. Cullen. The usual practice of removing this state by *bloodletting*, he remarks, is often precarious; for sometimes, instead of preventing, it will indirectly induce or increase vascular fulness. Besides, if depletion be carried too far, the complaint may be thereby increased. "Venæsection therefore may either increase the plethora, or induce inanition; and it is only to be used in recent cases, and where there is manifestly a full habit." A *spare diet* and *regular exercise*, particularly in the open air and in the light of day, *early rising*, and *cooling aperients*, are the means upon which the chief reliance ought to be placed in removing this state, and especially as they tend also to strengthen the nervous system, and to prevent local turgescence and irritation. The frequent association also of dyspepsia, and of gastro-intestinal disorder with hysteria, renders this regimen still more necessary. When depletion, however, is indicated by the turgescence, or chronic inflammatory state of the uterine organs, or by impaired or obstructed menstruation, it should be practised in the manner already advised (§ 68.).

74. When the vascular system is deficient, rather than too full, of blood, and when this fluid seems thin or poor (the *Hysteria chlorotica* of Sauvages), then *tonics*, especially the *preparations of iron* and *chalybeate mineral springs*, will be most beneficial; but they should be aided by air and exercise, and the other means already advised for improving nervous energy (§ 71.). The sulphate of iron with the extract of hop, or with the compound galbanum, or with the compound aloetic

pill, according to the states of the bowels and of the catamenia; the compound mixture of iron, &c.; and a moderately nutritious or milk diet, will be eminently beneficial in these cases. If the patient complain of weaknes in the loins and limbs, a large *plaster* of the red oxide of iron, or the aromatic plaster, should be worn on the lumbar region, in addition to the employment of the other means already recommended.

75. *D. With reference to the state of the digestive organs.*—Irritation of the digestive mucous surface, in connection with hysteria (§ 52.), is often most successfully treated by a mild spare diet and moderate exercise in the open air. If the patient be plethoric, or complains of pain or soreness, or of tenderness in the epigastrium, abdomen, or hypogastrium, *local depletions*, particularly the application of leeches on the abdomen, and *cooling diaphoretics*, with external *derivatives*, will be appropriate, as respects both the digestive and the hysterical disorder. If the bowels be costive, the *cooling aperients* (F. 96. 790.), or the preparations of *rhubarb* with *ipecacuanha*, *calcined magnesia*, or *castor oil*, will be useful. If they be relaxed, the *hydrargyrum cum cretâ*, with *rhubarb* and *ipecacuanha*, — or this last with the *extract of hop*, or of *poppy*; and *refrigerants* conjoined with *demulcents*, will be serviceable. In cases of *hysterical colic*, and of irregularity of the bowels in hysterical persons, a frequent recourse to *enemata*, — to those consisting of cold or of emollient fluids, and sometimes of cooling aperients,—will generally prove of great benefit. When the catamenia are at the same time disordered, clysters containing the spirit of turpentine are frequently very useful. The state of the digestive organs often requires *tonics* and *stomachics*; but these remedies may prove too stimulating, unless they be given with *refrigerants* and *antacids*, as with the nitrate of potash, and the carbonate of soda. Aloetic and heating or acrid purgatives, particularly those which excite the rectum and large bowels, are sometimes injurious. The propriety of exhibiting them, even when hysteria is associated with scanty or obstructed catamenia, is occasionally even doubtful, particularly when general or local plethora, or excitement, is present, unless these have been removed by suitable depletions; and then the *compound decoction of aloes*, with a little of the solution of potash, may be preferred. When flatulence is distressing, as it often is, the treatment should altogether depend upon its connection with gastro-intestinal irritation, or with uterine excitement or turgescence. In the former case, the means just stated should be prescribed, aided by the application of a *large rubefacient plaster*, or the compound galbanum or pitch plaster, on the stomach or abdomen. Mint water with calcined magnesia, and an aromatic or carminative, or the infusion of *calumba*, or of *chyrita*, with the carbonate of soda and compound tincture of cardamoms, will generally also be serviceable.

76. iii. TREATMENT OF THE IRREGULAR AND COMPLICATED STATES. — The *intentions of cure* in these states of hysteria, are — 1st, *To remove existing disorder in the uterine and digestive organs, or in the cerebro-spinal centres*; — 2dly, *To allay the local affection, by means appropriate to its peculiar characters*;—and, 3dly, *To make a forcible impression, mentally and physically, on the nervous system*, so as to allay the primary nervous affection, and to break the chain of nervous sympathy. These intentions are severally more or less applicable to all the nervous states about to be noticed; but a great difference will be shown to exist in the modes or means of their fulfilment, and in the dependence to be placed upon them individually.

77. *A. The painful affections depending upon this complaint*, or arising from irritation or turgescence of the uterine organs, influencing sympathetically (§ 13.) related or distant parts, require means, in some cases at least, different from, or additional to, those already mentioned.—*a.* The treatment of *Hysterical headach* is fully stated in the article HEADACH (§ 40.).

78. *b. Pain in the left side of the thorax, simulating pleuritis*, or *pericarditis* (§ 15.), is difficult to remove, especially if there be tenderness in the dorsal portion of the spine, and disorder of the uterine functions. If the catamenia are scanty, and especially if there be more or less vascular plethora, cuppingon the loins or sacrum, or the repeated application of leeches to the loins, and cooling or mild purgatives, will be necessary. In other circumstances, and in such cases, after these means have been employed, the effects of *antispasmodics* and of *narcotics* may be tried, especially of camphor or ammonia, with valerian or assafœtida and henbane, &c. If the pain be attended by *palpitations of the heart*, &c., the decoction of senega may be prescribed with mint or orange-flower water, carbonate of soda, and tincture of henbane; — or camphor may be given in a mucilaginous mixture with hydrocyanic acid. Immediate relief is often obtained by applying on the pained part a piece of flannel wrung out of hot water, and sprinkled with spirit of turpentine, or with the following liniment: —

No. 261. ℞ Linimenti Camphoræ Comp., Linimenti Terebinthinæ Comp., āā ℥j.; Olei Cajuputi et Olei Limonis āā ʒj. M. Fiat Linimentum vel Embrocatio.

These embrocations should be covered by a dry cloth, or by wash-leather, to prevent evaporation, and be kept applied to the affected part until they occasion redness and burning heat of the integuments. I have seen the pain removed also by the inner bark of the mezereon, previously moistened and softened, and kept applied to the part until a superficial sore was produced. — If pain or tenderness in the spine be also complained of, the means about to be noticed (§ 85, 86.), may be prescribed.

79. *c. Hysterical pain in the regions of the stomach and spleen* (§ 17.) often resists medicine, and disappears spontaneously, especially after marriage, or from changes in the states of the uterine system. It is sometimes relieved by camphor conjoined with hydrocyanic acid or with the acetate of morphia, or by the other antispasmodics and anodynes mentioned above (§ 78.). The warm epithem and embrocation, just recommended, has, however, proved most successful in my practice. Large doses of the subcarbonate of soda, with a carminative mixture or spirit, and tincture of henbane or of opium, often afford relief. An enema, containing either the spirit of turpentine and castor oil, or assafœtida and confection of rue, generally proves very serviceable.

80. *d. When pain is severe in the region of the descending colon and left iliac region* (§ 18.), or in *other parts of the abdomen*, with flatulent distension, increased sensibility, and other symptoms

resembling *peritonitis* (§ 21.), the above treatment is more to be depended upon than any other. The warm epithem or embrocation should never be omitted. The enema just prescribed will seldom fail of emptying the large bowels, and of expelling the flatus which is a chief cause of the more painful symptoms. When the complaint assumes the form of *hysterical colic*, the bowels being costive, these means are usually eminently successful. They may require, however, to be repeated. If palpitations be present in these cases, they depend upon, or are aggravated by, the flatus which often rises up into the œsophagus, and, by distending a portion of this canal, embarrasses the auricles of the heart. Hence the benefit which results from the means which are most efficacious in expelling the flatus, particularly from those just named; and from calcined magnesia, prescribed with antispasmodics and carminatives, or warm purgative tinctures. — *For pain in the region of the liver* (§ 30.), the treatment here advised will be appropriate. In all these states of the complaint, the bowels should be kept moderately open by mild or stomachic purgatives.

81. *e. When pain is seated behind, or just above the pubis* (§ 20.), and particularly when it extends to the sacrum, to the os coccygis, or when it implicates the urinary bladder, or its functions, irritation, or vascular turgescence, or congestion of the uterus, may be inferred. Local depletions ought then to precede other means; and the mode, amount, or repetition, of depletion, should depend entirely on the habit of body of the patient, and the state of the catamenia. After those have been prescribed, the bowels must be evacuated by mild or stomachic purgatives, and the circulation equalised by cooling diaphoretics and anodynes. Camphor mixture, almond emulsion, solution of acetate of ammonia with nitrate of potash, spirits of nitric æther and tincture of henbane, are generally useful in these cases. But if the pain still continue, the external means above advised, and the enemata (§ 78, 79.), should be resorted to.

82. *f. Pain in one or both mammæ* (§ 29.) is sympathetic of irritation or turgescence of the uterus or the ovaria; but it is sometimes associated with tenderness of one or two of the dorsal vertebræ. It is often removed by the treatment now prescribed. If there be scanty menstruation, leeches may be applied to the mammæ; but the tops of the thighs, and hypogastrium, are preferable situations. I have found cooling diaphoretics with narcotics, as the solution of the acetate of ammonia, and camphor julep, with the acetate of morphia and an aromatic spirit, very serviceable in this state of disorder. In a case of this kind, where there were remarkable tenderness and hardness of the left mamma, evidently depending upon uterine irritation and turgescence, and for which I was consulted by another practitioner, complete recovery followed a short course of the solution of the iodide of potassium in camphor mixture, to which the solution of potash and henbane were added. If tenderness exist in any of the dorsal vertebræ, the treatment advised for this complication (§ 85.) should also be pursued.

83. *g.* In the *more acutely painful or neuralgic affections* connected with uterine disorder, the effect of a plaster with the extract of belladonna and camphor may be tried. But when they are associated, as sometimes observed, with pain or tenderness in some portion of the spine, then the other local means about to be noticed may be also employed. I have seen the most marked benefit result, in these more acute cases, from half an ounce each of spirits of turpentine and castor oil, taken on the surface of milk, and repeated once or twice after the intervals of a day or two; or from a full dose of the former medicine, followed by the enema already mentioned (§ 79.), or by any suitable purgative. Repeated doses of turpentine, until either the kidneys are affected, or the bowels are entirely evacuated, and enemata containing a considerable quantity of this substance, will be found the most efficacious, when painful affections, connected with hysteria, are seated in, or extend to, the lower extremities.

84. *h. Pain in the region of the kidneys, and in the course of the ureters* (§ 22.), is evidently an extension of irritation from the uterus to these organs by direct sympathy, — a considerable portion of the nerves of the generative and urinary organs belonging to the same ganglia. The treatment should, therefore, be chiefly directed to the state of the uterine system. Local depletions will sometimes be requisite, especially if there are general or local plethora, and scanty menstruation. The fixed alkalies or the alkaline subcarbonates, with anodynes and the spirits of nitric æther or the compound spirits of juniper, will occasionally be of service, especially when the urine deposits a sediment of uric acid in the form of sand. When the urine is higher coloured, or deposits a pink or amorphous sediment, consisting chiefly of the lithate of ammonia, the infusion or decoction of cinchona with hydrochloric acid, or the balsams taken in the form of pills with magnesia, will be found beneficial. The digestive functions should receive due attention. A rubefacient, stimulating, or roborant plaster applied on the loins, as the aromatic, cummin, pitch, or ammoniacum plaster, will often also afford some relief.

85. *i. Pain in the spine* (§ 23.) is rather a complication, than a form, of hysteria; and is not to be viewed as altogether, or always, depending upon inflammatory action or irritation; but rather upon excited sensibility. There is no doubt that vascular excitement or congestion often exists in these cases, especially where there is much tenderness or prominence of one, two, or more of the spinal processes, or puffiness around them. In these cases, especially, there is more or less continued disorder of the uterine, or of the digestive, or of the respiratory functions, or even of all of these, according to the seat and extent of the spinal affection; and occasionally the cerebral circulation becomes also deranged. To this affection, DARWELL, TEALE, TATE, BROWN, and GRIFFIN have directed particular attention, under the name of *Spinal Irritation*, or, more properly, irritation of the spine, and have recommended for it local depletions and external irritants, &c. But whoever confides in these alone, or even principally, will find himself disappointed in many, if not in the majority of cases. They often, however, are important parts of the treatment, especially if plethora, general or local, or scanty menstruation, exists. In cases of this description,

the digestive functions should receive strict attention, the bowels being kept regularly open. In the majority, and particularly if there is debility or deficiency of blood, or too frequent or too copious menstruation, the sulphate of quinine, with camphor and extract of hop, or extract of hyoscyamus; the preparations of cinchona, with the alkaline subcarbonates, or with the mineral acids, according to circumstances; and the preparations of iron; will prove of great service, if appropriately administered. In some instances of the association of hysterical affection with tenderness of the spine, and with neuralgic pains in the corresponding nerves, I have found, after local depletions and alvine evacuations, pills containing full doses of the sulphate of quinine and sulphate of iron, with camphor and extract of hyoscyamus, very beneficial, and have added the purified extract of aloes to them with advantage, when the bowels were costive, or the catamenia deficient. Where the powers of the constitution are not impaired, or where there is excited action, an occasional recourse to the draught with spirits of turpentine and castor oil, or to the enema containing the same substances, will be of essential service.

86. *External means* of various kinds have been applied to the spine in these cases, often without benefit, sometimes with detriment, particularly when the increased sensibility depended upon sympathy with other parts, and upon great nervous debility. When there is sufficient evidence to infer that inflammatory irritation and turgescence have been excited in the membranes or investing structures of the spinal cord, then certain of these applications, as leeches, scarification and cupping, the tartarised antimonial ointment, or issues, will be more or less beneficial; but in other circumstances they will be of no service. The relief which has followed the application of blisters, or of rubefacient and stimulating plasters, is no proof that the morbid sensibility of the spine depended in these instances upon inflammatory excitement or vascular turgescence; for, if these morbid states had existed in any degree of sthenic activity, these applications were more likely to have aggravated, than to have removed, them. Where they have actually given relief, there is reason to infer that the morbid condition was one of deficient vascular and nervous energy, rather than the reverse; and one for which general restoratives or tonics, as well as local excitants, were required. Much attention to the states of the various functions, particularly of those of the abdominal and pelvic viscera, and great discrimination, are necessary in these cases, to determine aright as to the local means appropriate to the various conditions of this class of affections. There are some applications which will not be injurious under any circumstance, but will be serviceable in many. The chief of these are the warm terebinthinate epithem and embrocation already noticed (§ 78.), applied over that part of the spine, chiefly, where pain is felt. Plasters, also, consisting chiefly of ammoniacum, compound pitch, or of red oxide of iron, &c., will subsequently prove useful. Where signs of inflammatory action of the ligamentous or other structures of the spine are present, the above liniment, epithem, or embrocation, applied to the affected part; and setons, issues, or open blisters, some distance below it, so as to produce a derivation from the seat of morbid action; will frequently afford great relief.

87. *k. Pain in the sacrum and os coccygis* is generally not to be imputed to the same morbid states, as that referred to the spine. It frequently depends upon the condition of the uterus, particularly about the *os* and *cervix uteri*, and requires the same treatment as that advised for pain behind or above the pubis (§ 81.). Whether proceeding from this source, or from disorder near the origins of the nerves, or from disease of the structures of the spine, or of adjoining parts, the means just recommended, constitutional as well as local, will be useful when judiciously employed.

88. *l. Hysterical affections of the hip or other joints* (§ 26.) are very difficult to manage, and require, for their removal, not merely an improvement of the general health, but also strong impressions upon the mind and nervous system. The *intentions of cure* above stated (§ 76.), should be fully followed out, and the particular means already described fairly tried. The medicines which I have found the most successful are — the *spirits of turpentine* *, prescribed in various modes, internally and externally, and administered in enemata; the *preparations of iodine*, alone, or with *narcotics*; and *camphor*. These, however, should be associated with suitable adjuvants; amongst which, the several *narcotics* and *antispasmodics* are the most important. The warm or vapour bath, simple or variously medicated; mental excitement, and exercise taken regularly and energetically; and employment of the mind; are also important aids in the treatment. The affections of the joints are sometimes accompanied, or even alternated, with severe nervous pains in the extremities, and occasionally with tenderness in some portion of the spine. In such cases, the treatment hardly requires any material alteration. In those which have come under my care, I have very frequently prescribed the spirit of turpentine, as already stated (§ 83.), and often repeatedly in enemata; and, after two or three doses of it, I have commenced with the preparations of iodine, conjoined with henbane, opium, or belladonna. Whilst the iodine has been given, the turpentine has been administered in enemata, from time to time; and the embrocation or liniment above described (§ 78.), assiduously employed. In recent cases, particularly when the knee-joint was affected, this treatment has removed the disorder in a few days. In the case of a lady, whom I saw with Mr. FAXON, the complaint in this joint was almost instantly removed by the warm turpentine epithem applied around the knee. Various other medicines may be tried, and, indeed, require to be tried, before some of the foregoing will be submitted to by the patient. Most of the cases which I have seen, have been very obstinate, and have been treated by the more usual remedies, as the mineral sulphates, the preparations of iron, the sulphate of quinine, narcotics, &c., before I saw them. Sir B. BRODIE mentions favourably a

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* The spirit of turpentine was first recommended by the author for these states of hysteria, and for neuralgic and similar affections. It has recently been advised for the same complaints by some French physicians. The originality of the practice may be known, by referring to *A Memoir on the Employment of Terebinthinous Remedies in Disease*, by JAMES COPLAND, M.D. &c., published in the *Lond. Med. and Physical Journal*, for July and August, 1821, p. 107—193.

long continued course of the sulphate of copper in small doses. The external application of the vegetable alkaloids, and of their salts, particularly veratria, aconitina, &c., in ointments or liniments, has recently been recommended for cases of this description, and particularly for those attended by neuralgic pains, in much stronger terms than the real advantage derived from them warranted. I have prescribed these preparations in several instances of this kind, and have had the prescriptions prepared by the very best chemists, but permanent advantage was seldom derived from them.

89. Local hysterical pains will sometimes be relieved by friction with a stimulating liniment containing some narcotic (F. 297. et No. 261.) Sir B. Brodie recommends a lotion consisting of equal parts of spirit of rosemary and camphor mixture to be applied tepid to the affected part. The simple exposure of the part to the vapour of hot water — the heat and vapour being confined by oil-skin, or by any other means — will often be useful. The vapour bath, employed thus locally, will be still more serviceable when the affected limb is cold, or is alternately hot and cold. It has been recently prescribed by Dr. J. Wilson in these and similar affections. (*Pract. Treat. on the Curative Effects of Simple and Med. Vapour applied locally, &c.* 8vo. Lond. 1837.) — Sir B. Brodie states, that he has found the hysterical painful affections characterised by alternations of heat and cold, much relieved by the following plan: — "During the hot fit, let a compress be applied wet with a cold spirituous lotion; and when the heat has subsided, let a thick woollen stocking be drawn over it, and then an oiled silk covering over the stocking, so as to confine the heat and perspiration. When the cold fit has subsided, the oiled silk covering may be removed. This treatment, however, should be combined with the exhibition of the sulphate of quinine." I have found the quinine more beneficial when given with camphor in these cases. The oxides or carbonates of iron may also be tried in electuaries; and conjoined with the confection of senna or of scammony, when the bowels are costive.

90. *B. When hysteria assumes anomalous spasmodic forms, or stimulates other spasmodic affections* (§ 31.), the same principles of treatment as have been already explained should be adopted, according to the states of general or local vascular plethora, and of uterine function, and to the symptoms referrible to the spine. There are few cases of this kind in which the spirits of turpentine, judiciously prescribed, or administered in enemata, will not prove of essential benefit; and some will require, in addition, the warm epithem, liniment, or embrocation, already described (§ 78.). But these can often be resorted to only at considerable intervals. The tonics, antispasmodics, and anodynes, — the general plan of treatment recommended, — must be duly exhibited; and if evacuations be necessary, they should be resorted to as above directed. In most respects, these affections require nearly the same *indications of cure*, and the *same means* to fulfil these indications, as have been directed for the more painful complaints just passed under review, and particularly for those seated in the joints and extremities.

91. For *hysterical cough* or *asthma*, antispasmodics with anodynes or narcotics are very useful. The preparations of valerian with ammonia or camphor, and henbane; a weak decoction of senega with emollients and hydrocyanic acid; small doses of ammoniacum, assafœtida, or of squills, with demulcents; the alkaline subcarbonates and extract of poppy, &c.; will severally be found of service. The treatment, however, must be modified, as previously advised, according to the states of the constitution and habit of body, of the catamenia, and of the temperature of the surface. The *external means* described above (§ 86.), will very materially assist the internal remedies; and sometimes the warm bath will be useful. — In *hysterical hiccup*, camphor and other antispasmodics, with anodynes, and the means just noticed, cold fluids, and cold enemata, will be found advantageous. (See also the *Treatment* advised for Convulsions, and for Chorea and its related Affections.)

92. C. *The comatose, cataleptic, or soporific states of hysteria* (§ 33.) require but slight modifications of either the indications or means insisted upon above. During these states, the remedies advised for the paroxysm may be employed, appropriately to the local or general states of the circulation; and the most important of these are cold affusions or cold lotions on the head; and, in some instances, enemata of cold water, or containing the spirit of turpentine, or assafœtida, or camphor. Subsequently the treatment should be directed according to the state of the cerebral circulation. In most cases of this kind, the disorder of the uterus has excited, or otherwise deranged, the circulation in the brain; but generally in such a manner as to be relieved by the shower bath, or by frequently sponging the head with cold fluids. Due attention to the states of the bowels and of the catamenia, and the other means advised for Catalepsy and Cataleptic Ecstasy (§ 18.), are necessary for cases of this kind. When hysteria assumes the form of *syncope* or *leipothymia*, sprinkling the face with cold water; the *cold douche*, or affusion on the head; volatile or empyreumatic vapours, held at some distance from the nostrils; bathing the face and neck with aromatic waters or spirits; pure air, &c.; are the chief means of restoration; after which the treatment must be conducted as above.

93. *D. Paralytic affections and aphonia* (§ 35.) hardly require any notice as respects the treatment, as the *indications* and *means* of cure already prescribed, are equally appropriate for them. After the bowels have been freely evacuated, and local irritations or congestions removed, a resolute exertion of volition, exercise in the open air, and mental and bodily employment, as far as they can be pursued, are especially beneficial in them, particularly when aided by a judicious administration of tonics or antispasmodics; by suitable diet and regimen (§ 100. *et seq.*); and by recourse to external remedies—particularly to frictions of the surface with stimulating and rubefacient liniments, to warm or medicated baths, &c.—When the paralytic state is manifested chiefly in the alimentary canal or urinary bladder, enemata containing the spirit of turpentine, or the warm terebinthinate epithem, or embrocation, applied over the abdomen, will be found almost immediately efficacious.

94. *E. Hysterical disorders of the mental faculties* consist not merely of the states already men-

tioned (§ 38.), but of others, of a less decided, but not less morbid, kind. Hysterical females are not merely capricious or whimsical; but they often become enthusiastic for a time, in the pursuit of an object, or in cherishing an emotion by which they have been excited. In many such cases, the nervous excitement and vascular turgescence of the uterine organs determine the character of the mental disorder; elevating certain of the moral sentiments, or of the intellectual manifestations, to a state of extravagance, passing, in some instances, into delusion or monomania. Many cases of puerperal mania are merely extremes of the hysterical disorder of the moral and intellectual powers or states of the mind. All these more extreme forms of mental affection are observed only where, in connection with much local or uterine irritation, there is great deficiency of nervous energy generally, and of mental power in particular; or where, with such deficiency, there has been either much injudicious culture, or perversion, or improper excitement, of the imagination.

95. Females sometimes become passionately attached to an object; and this passion may advance even to nymphomania or monomania. The same person, on experiencing a disappointment in her affection, or if she be placed in circumstances entirely preventing the enjoyment of her passion, often becomes enthusiastically religious, especially if powerfully excited by popular preachers. After field preachings, or other ministrations of an exciting kind, the most hysterical females, especially those who have experienced the fully developed fits on these occasions, have become, at least for a time, the most religious. In this, however, there is little to regret: there is no harm, and generally much good, from this direction of the feelings; unless, indeed, advantage be taken of this excitement by certain Tartuffes, especially at love-feasts, &c., — a circumstance by no means rare.

96. The hypochondriacal feelings, the desire to deceive, or to simulate various diseases, or the delusions, which sometimes possess the minds of hysterical females, may be classed with the foregoing, as requiring a similar plan of treatment. In all of them, the *intentions of cure* are — to remove irritation or vascular turgescence of the uterine organs; to improve the general health; to strengthen the nervous system; to calm the imagination; and to guide the moral impulses of the patient. The means by which the physical portion of these indications are to be fulfilled, have been sufficiently explained. The most efficient, however, of these means are not likely to be adopted by the patient, if she is entirely uncontrolled by friends. Few will resort daily to the shower bath, or even occasionally to terebinthinate enemata, or submit to a course of tonics, or to a suitable regimen, &c., whilst she believes her health but little affected. Even when the hysterical disorder is of a very painful kind, the variability or capricious state of her mind leads her to run from one physician to another, before opportunity of administering aid is afforded to any. At last, the most notorious charlatans, particularly those who either excite the body through the mind, or the mind through the body, — the animal magnetisers, the Homœopathists, the St. John Longs of rubbing celebrity, and the Campbells of celestial-bed notoriety, — fix her attention. At such medical bagnios there is something promising gratification as well as excitement, and at such places hysterical as well as hypochondriacal patients "most do congregate."

97. iv. OF THE PROPHYLACTIC TREATMENT OF HYSTERIA. — *a. The avoidance of the occasional causes* is the chief part of this treatment; and this is very difficult. The moral emotions and desires constitute the principal of these causes, and the prevention of them is not in the power of the physician; and, considering the general frailty of our nature, rarely in the power of the patient. — A physician, sufficiently acquainted with human nature, and with human life and society, will frequently discover the connection of the complaint with the feelings, and be able to give useful hints to the patient or her friends, as to the moral as well as to the medical management of the complaint. But his proper business is to correct the predisposing or constitutional cause, and to enable the patient to resist the exciting causes. An indolent, a luxurious, and an unoccupied life, leads to late hours in bed, to an excited state of the imagination, to susceptibility of the nervous system, to irritation and turgescence of the generative organs, and to general or local plethora. It cannot be sanguinely hoped, that females will relinquish ease, luxury, and enjoyment, from the dread of a distant and contingent ill. Most physicians of experience must have often observed the influence of these causes on the health, and have met with instances of females, who, when in ease and luxury, were subject to hysteria, having become entirely free from it, when reverses of fortune obliged them to employ both mind and body.

98. *b.* Much depends upon the *moral* and *physical* education of females about the period of puberty, in preventing hysteria. If more time were devoted to air and exercise, and less to mere accomplishments — if less strenuous efforts were made to cram much ill-assorted knowledge into the mind, in a very limited period — than usually is the case in the present day, an improved state of nervous energy, and of constitution generally, would result. There would consequently arise a race of females, possessed of stronger minds, and better able to make good wives and healthy mothers, than those too frequently met with in the easier ranks of life.—Of all the physical influences, by which the human constitution is permanently impressed in early age, there are none so powerful as *light*, *air*, and *exercise*. Females, while the frame is being developed, should strictly observe early hours, so that the *period of repose* should never be prolonged much after the dawn of morning. The propriety of *sleeping* in a large, well-ventilated room, cannot be disputed. It will be prudent, where more than one must sleep in the same apartment, to have separate beds, each no larger than is necessary for one person; and if the room is sufficiently large and airy, three, but no more, should sleep in it, preferably to two. When very early rising is enforced, the kind of bed, on which growing females should sleep, is not very important, although a hair mattress is perhaps the best; but the bed-clothing should be light, and the sitting, as well as the sleeping, apartments ought to be moderately cool and airy.

99. The kind of exercise which is most serviceable, is that taken in the open air and in the light

of day, and which brings into action the voluntary muscles generally, especially those of the lower extremities. It should preferably be on foot, and be regular, daily, and neither too little nor excessive. SYDENHAM, FULLER, MANDEVILLE, and MANNING advise riding on horseback, as affording the briskest motion, and occasioning the least fatigue. It ought always, however, to be used when the stomach is most empty; for, after a full meal, it retards digestion, rendering it uneasy and flatulent. It is most serviceable when hysteria is associated with retention of the menses, and a chlorotic state of the system, or when there is torpid action or obstruction of the digestive and abdominal viscera. In cases of this description, the advice given by MANDEVILLE will be found of great benefit. This is, to rise before six; to have half an hour's exercise in a swinging chair, flying horse, or the common swinging rope, and then breakfast; some time afterwards to get on horseback, for at least two hours, either galloping or trotting, as much as her strength will permit her; and, immediately after this, to be undressed, and assiduously chafed or dry-rubbed for a considerable time, till her skin looks red, and her flesh glows all over. MANNING observes, that frictions are useful, not only in the cure of the paroxysm, but also as a prophylactic. He directs them to be used on the extremities and trunk of the body, and especially on the abdomen when the digestive organs are weak. If hysteria be attended with the anomalous symptoms already noticed, or assume an irregular form, friction applied daily and assiduously along the spine, will be of great service. Sailing has been recommended by Dr. GILCHRIST, in the treatment of hysterical and other nervous complaints; and in certain circumstances it will be found useful.

100. *c.* *Cold bathing*, particularly salt-water bathing and the shower bath, will generally be serviceable at this period of life, if females have no particular dread of either, and if the surface of the body be afterwards well rubbed, and smart exercise immediately taken. For delicate constitutions, with a predisposition to the disorder, it will be preferable to commence with a warm salt-water bath, or with a tepid shower bath, the temperature being gradually lowered to the usual grade. Sponging the surface of the body also, every morning, with salt and water, or with water containing some vinegar or a little of the nitro-muriatic acid, the temperature being at first tepid, but gradually reduced to the usual mean of cold, will generally prove most beneficial, not only in preventing the complaint, but also in removing it.

101. *d.* Various *mineral waters* frequently prove of great advantage in the preventive, as well as in the curative, treatment of hysteria. There is no doubt of the *Bath* waters being often beneficial in this complaint, although fashion has brought them into disuse, by bringing others into more general notice than they deserve. In females of a delicate constitution, with a languid state of the circulation, and want of tone of the nervous and muscular tissues, these waters, with proper management, will generally be most useful. In a similar state of system, the mineral waters of *Vichy*, *Barèges*, *Marianbad*, *Eger*, *Carlsbad*, *Pyrmont*, *Spa*, *Hartfell*, and *Tunbridge*, will also be of great service, if employed appropriately to the pathological peculiarities of the case. The stronger chalybeates, however, should not be prescribed when the complaint is connected with general plethora, or where there is very marked vascular turgescence, or excited action of the generative organs. Where these waters are indicated, as well as in more doubtful cases, the springs of *Ems*, of *Bath*, and of *Seltzer*, will often be very beneficial. Seltzer water with warm milk may be used as the common beverage in most cases. As most of these waters may be procured in London and Brighton, there can seldom exist much difficulty in trying them, without leaving this country, or even the patient's home. The warm mineral waters can, however, be used only in *Brighton*, where they are prepared in a way not much inferior to their natural state. — In connection with the use of suitable mineral waters, *change of air* will be most beneficially prescribed. Indeed, much of the benefit attributed to the former actually proceeds from the latter; and in all cases where benefit is derived, both means are concerned in producing it.

102. *e.* The *diet* of hysterical females, as well as the medicines prescribed, should have strict reference to the states of the vascular system and of the uterine organs. In general, a milk diet, as advised by SYDENHAM, is very serviceable, particularly where debility is present; but much animal food is hurtful, especially where there is a tendency to plethora. A fish diet, and the use of shell-fish, are not less injurious, as favouring uterine turgescence, although much less productive of vascular fulness. A spare and cooling diet, consisting chiefly of farinaceous substances, is the most generally appropriate; but a somewhat liberal use of animal food is occasionally requisite. Slops, as weak tea, should be avoided. Boiled milk and bread should be preferred to either tea, chocolate, or coffee. The last is generally too heating, and ought not to be allowed, when the symptoms of uterine turgescence or irritation become very prominent.

103. *f.* Patients subject to hysteria should avoid warm apartments, and crowded rooms or assemblies. The extremes of *temperature* are often injurious to them. They should preserve their extremities warm, and be careful not to confine any part of the body, and particularly the waist, by too strait clothes or stays. — Mental and physical *occupations* are amongst the most beneficial means of treatment in this complaint; and advice respecting them should never be overlooked by the physician. The nature or kind of employment must entirely depend upon the circumstances and condition of the patient. The reading of exciting novels and of loose romances, and even music, are mere dissipations of time. The former ought not to be permitted by those who have the power of preventing it: and the latter should be subjected to a judicious control, and cultivated truly as an accomplishment, and as a relaxation from severer, and more rational, and more useful occupations.

104. As to advising marriage for young hysterical females, this, perhaps, may be as well let alone, although I do not altogether agree with MANDEVILLE, as to the risk of their children inheriting the complaint. He remarks, " in the first place, it may fail, and then there are two people made unhappy instead of one; secondly, it may but half cure the female, who may have half a

dozen children that shall inherit it. A physician has a public trust reposed in him: his prescriptions, by assisting some, ought never to prejudice others; besides, a young lady may not marry so well whilst she labours under this infirmity, as if she was in perfect health. Therefore, let her either be first cured, and then marry without being injurious to herself, her husband, or her posterity; or else remain single, with this comfort, at least, in her affliction,—that she is not liable to entail it upon others, who should be no less dear to her than herself." A principal reason for hysterical mothers having children that are hysterical and nervous, is, that they are generally bad nurses,—their milk being either deficient, or innutritious: when their infants are suckled by strong and healthy nurses, no such hereditary influence is usually observed. Nothing is of greater advantage in hysterical disorders, than mental tranquillity and cheerfulness. Fear, grief, and anxiety ought to be avoided, and the mind should be agreeably entertained and interested by useful employment.

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HYSTERITIS. See Uterus—*Inflammations of.*

JAUNDICE. — Syn. *Icterus* (from Ικτερος, the golden thrush, the sight of which was supposed by the ancients to cure the disease), Pliny, Cælius Aurelianus. *Morbus Regius*, Celsus, Pliny. *Morbus Arquatus*, *M. Arcuatus*, Columella, Celsus. *Aurigo*, Plautus, Varro.

Cachexia Icterica, Hoffmann. *Icterus*, Boerhaave, Linnæus, Cullen, &c. *Cholelithia Icterus*, Young. *Icteroides, Fellis Suffusio, Fellis Obstructio, Icteritia*, Auct. var. *Jaunisse, Ictère*, Fr. *Die Gelbsucht*, Germ. *Iterizia, Citrinezza*, Ital.

CLASSIF. — 3. *Class*, Cachetic Diseases; 3. *Order*, Cutaneous Diseases (*Cullen*). 1. *Class*, Diseases of Digestive Function; 2. *Order*, Affecting the Viscera (*Good*). IV. CLASS, I. ORDER (*Author*, in *Preface*).

1. DEFIN. — *Yellowness of the eyes and skin, sometimes passing to a yellowish-green hue, or even to a greenish brown; the urine being of a saffron or deep colour, the stools generally pale, and the course of the bile obstructed.*

2. There are few diseases, the nature and morbid relations of which have occasioned greater diversity of opinions than jaundice. By some it has been viewed as a symptom of derangement, or of organic lesion, of the biliary apparatus, more immediately dependent upon obstructed discharge, and upon absorption, of bile. Others have considered it as independent of absorption of this secretion, and as the result of a morbid state of the capillary circulation. These, as well as other opinions, will be more fully noticed in the sequel; and I shall then show that it cannot be considered merely as a symptom of the morbid states of the biliary apparatus, to which it has commonly been attributed, although very often connected with, and sometimes originating in, these states. It occasionally appears in the course of bilious fevers, when there is no obstruction to the evacuation of bile. But the yellowness observed in the last stage of yellow and malignant fevers is not a symptomatic jaundice, the change of colour depending, in these maladies, upon the morbid state of the blood, and upon the change in the capillary vessels and circulation, independently of biliary bstruction.

3. Jaundice is generally *sporadic*; but, according to MONRO, ALIBERT, and others, it has assumed, on rare occasions, an *epidemic character*, particularly at the terminations of campaigns, and after, or during, very wet summers and autumns. It was thus said to have been epidemic in Cronstadt, in 1784 and 1785; and at Geneva, in 1814.—It is *endemic* in some places, particularly those in which, with a high range of temperature, the sources of malaria abound (see ENDEMIC AND EPIDEMIC INFLUENCES); but it is generally owing to the prevalence of biliary diseases and periodic fevers in these localities, that jaundice is also endemic.

4. I. SYMPTOMS.—*A. Precursory.*—Jaundice generally approaches with languor, depression of spirits, slight chills or rigors, anorexia; with uneasiness, tension, or weight at the præcordia; with flatulence, sour eructations, sometimes nausea or vomiting, or other disorders of the stomach; or with colicky pains, disturbed or irregular bowels, and headach. The stools are hard, ash-coloured, clayey, or whitish, indicating an absence of bile; and sometimes relaxed, although the evacuations are pale or whitish. In rarer cases, the biliary secretion is apparently more than usually profuse. The stools are commonly devoid of their usual odour, and are more or less offensive. There is an unpleasant taste in the mouth, with some thirst. The tongue is loaded at its base. The skin is dry, and an itching or stinging is often felt on the surface. These symptoms are usually of short duration, and the affection manifests itself with much celerity.

5. *B.* The *yellow tinge* generally begins in the eyes, and extends to the temples, brows, and face; and thence to the neck, chest, and whole surface of the body. The colour is deepest in the wrinkles and folds of the skin, and in the lines of the face and hands. Sometimes it is distributed in deeper patches in one place than in another. It commences in the superior parts of the body, appears latest on the inferior extremities, and departs first from the parts where it commenced. The colour varies from a light yellow or lemon-colour, to a greenish brown; the intermediate shades of pale yellow, deep yellow, and yellowish green, being most common. With dryness of skin there is generally increased heat, particularly on the hands and feet. The itching and stinging are often also augmented, especially towards the night, and are most troublesome about the nostrils. In the more advanced stages, this symptom is diminished. The perspiration often then becomes free, particularly if the disease be attended by fever; and in some cases so abundant as to wet the linen, and to tinge it of a deep yellow. Sometimes a desquamation of the cuticle, or a psoriform eruption, follows these symptoms.

6. The bowels are frequently costive, and the fæces clayey, pale, and scanty; but in some cases they are loose, and have a peculiar fœtor. The urine is commonly high-coloured; yellowish and limpid at the commencement, afterwards deep saffron-coloured or reddish, frothy, and thick. Sometimes it is nearly black, depositing a brick-coloured sediment; at other times a dark deposit. As the disease subsides, the urine resumes its clear and limpid appearance, unless dropsy supervene. The patient generally complains of a severe, heavy, or lancinating headach, with a sense of heat, particularly at the forehead; and he often falls into a state of despondency or melancholy, or becomes morose. There is sometimes lethargy, and frequently watchfulness. The tongue and palate are coated with a yellowish sordes, and a bitter taste is felt in the mouth. The appetite is extremely irregular; sometimes being entirely lost, at other times ravenous. Thirst is usually present. Pain, weight, or a dragging sensation, and tenderness, are often felt at the epigastrium; frequently with flatulence, acrid eructations, nausea, difficult or painful digestion, and vomiting of a bitter, acrid, and sometimes dark, fluid. In some cases, acute pain runs in the course of the common duct, and increases as it reaches the epigastrium, with more or less uneasiness in the region of the liver, and top of the right shoulder, or beneath the right scapula, or between the shoulders. Violent pain is occasionally felt in the stomach, with short fits of colic. The respiration is readily accelerated, especially upon exertion; and there are sometimes paroxysms of cough. The pulse varies exceedingly. At the commencement, it is often hard and strong, but it is also frequently feeble, particularly as the disease advances. When severe paroxysms of pain are complained of, the pulse generally becomes frequent, hard, or full; but it is occasionally much slower than natural. Hæmorrhoids sometimes occur during

the disease; and they have often, after having discharged freely, proved a salutary crisis. Epistaxis has also been followed by a favourable result; but less frequently than the former evacuation.

7. Some *anomalous* appearances have been remarked during jaundice, which are deserving of notice, from the light they may throw on its pathology. The most important of these are — 1st. The suddenness of the attack — the almost instantaneous occurrence of it after violent affections of the mind. — 2d. Its restriction to particular parts of the body. BEHRENS, VALSALVA, ETTMÜLLER, and others, have observed it confined to the palsied side, in cases of hemiplegia. Dr. CHAPMAN has seen it limited to the face. A similar case has occurred to myself: and instances of its appearance only in the eyes are not uncommon. Allied to these states is the varying deepness of colour in different parts of the body. The deep greenish brown, verging to black, of the skin, commonly called green or black jaundice, described by Dr. Baillie, has been observed in one part of the body, whilst the usual yellow tinge has existed in others. LANZONI met with a case, wherein the throat and face were green, the right side of the body a greenish black, and the left yellow.— 3d. The yellow tinge, which objects occasionally exhibit to the patient during this disease, has been a matter of dispute; but it has been noticed, and believed in, by the majority of ancient authors; and was first disputed by MERCURIALIS, and afterwards by HALLER, HEBERDEN, CHAPMAN, and a few others. I believe it to be of rare occurrence, but to undoubtedly occur, when the cornea, or humours of the eye, participate in the yellow tinge, with the other parts of the body.

8. *C.* DURATION. — Jaundice may disappear, or terminate fatally, in a short time; or it may continue for many months. When it proceeds from moral or mental causes, it is generally of much shorter duration, than when it depends upon visceral disease. In the latter case, it may endure even for years. — But instances sometimes occur of its rapidly fatal termination, when proceeding from acute visceral inflammation, particularly from inflammation of the substance of the liver, and when accompanied by depressed vital power, much fever, and a very frequent pulse. I have seen death occur as early as the fourth day in such circumstances. The darker forms generally proceed more rapidly, especially to an unfavourable issue, than the lighter shades of the complaint. But the duration of it entirely depends upon the constitutional powers of the patient, and the pathological conditions which occasion it.

9. *D.* TERMINATIONS. — Jaundice, like most other diseases, terminates in three ways. — 1st. In a return to health; — 2d. In some other malady; — and 3d. In death. — *a.* Restoration to the healthy state generally takes place without any apparent crisis, although a critical evacuation is sometimes observed. As soon as biliary obstruction is removed, the stools become darker; the urine paler, and the discoloration of the skin begins to disappear, the parts first changed being the first to regain their healthy hue. The *critical evacuations,* are *bilious diarrhœa,* very abundant *perspirations, hæmorrhoids,* and *menorrhagia.* In a case which I lately attended, the jaundice rapidly disappeared after the discharge of a blackish inspissated bile, which had evidently accumulated in the hepatic ducts and gall bladder for a long time. The quantity of this pitchy or tar-like matter which was evacuated, was surprising, furnishing a striking instance of the black bile or melaina of the ancients.

10. *b.* In other cases, the disease either acquires increased intensity, or assumes a modified character; — one of the varieties hereafter to be particularized occasionally changes into another. — In some instances, additional disorder is superadded, a severe or dangerous *complication* thus resulting; and in others, the jaundice disappears, but is replaced by another malady. Lethargy, coma, apoplexy, epilepsy, phrenitis, diarrhœa, cutaneous eruptions, inflammation and abscess of the liver, disease of the spleen or of the pancreas, dropsy, rheumatic attacks, &c., may thus supervene — the jaundice still persisting; — and ascites, anasarca, dysenteric attacks, abscess of the liver, and chronic enlargement of the spleen, may follow upon its disappearance. Jaundice is often, also, a symptom of inflammation and abscess of the liver; although these latter are sometimes consequences of the pathological state upon which this affection depends, particularly when they appear subsequently to it. But it is much more frequently a symptom merely; and is oftener consequent on, than antecedent to, or coetaneous with, inflammation or abscess of this organ. Indeed, chronic inflammatory action, or active congestion of the substance of the liver, giving rise to jaundice, is more common, and antiphlogistic means are much more frequently required for the removal of it, than is supposed.

11. *c.* The termination in death may be preceded by the morbid states now enumerated, particularly when they assume their worst forms; — or it may be ushered in by increasing and urgent depression; by sinking of vital power; by great despondency; by ascites or œdema of the lower extremities, or both; or by hydrothorax; by great emaciation, hectic fever, and total loss of the digestive and assimilating functions, and by irritability of the stomach. In some cases, it has given rise to lethargy, coma, apoplexy, palsy, convulsions, or delirium, previously to a fatal issue. — It occasionaly happens, as observed by Drs. CHEYNE and MARSH, that persons labouring under jaundice, whose nervous system has been previously injured, or greatly exhausted, are suddenly seized with cerebral symptoms, and die either phrenitic, or apoplectic, or in convulsions. But death by the sudden occurrence of coma, which becomes more and more profound, is the most common. Delirium also often precedes a fatal termination.

12. *E.* FORMS and STATES. — Jaundice may be considered as *idiopathic,* when it supervenes suddenly upon violent affections of the mind. It is *symptomatic,* — its common form, — when it proceeds from diseases of the liver and biliary apparatus, or from obstruction of the common bile duct, or from lesions of adjoining parts, &c. To these some authors have added a third form, which they have termed *critical.* GRIMAUD states, that it has occurred as a crisis in some fevers: and BIANCHI makes a similar remark, — at the same time stating, that when jaundice is critical, the

urine is almost or altogether natural; whilst in its symptomatic form it is generally of a deep yellow, and otherwise much changed.

13. Jaundice may present various *degrees of severity*. It may be accompanied with great febrile excitement, and thus assume an *acute form*, and quickly arrive at its termination. When this is the case, it is generally accompanied with active hepatic, or other visceral disease, and often passes into a very deep or greenish hue. I was recently called to a gentleman, aged about fifty, of a strumous diathesis, who had begun to ail the previous day. I found him slightly jaundiced, remarkably depressed in spirits, with a sensation of sinking at the epigastrium, the pulse being upwards of 120, and soft. The evacuations were at first clay-coloured and costive, but they soon became copious, black, and tar-like. Delirium appeared on the following day: spontaneous hæmorrhage from the bowels occurred, followed by coma, relaxation of the sphincters, and death on the fourth day. The jaundice progressively increased, and, on the third day, the surface had become a greenish brown. The friends would not allow the body to be inspected.

14. Jaundice may also proceed in an extremely *mild form*, or with but little constitutional disturbance,—the appetite, pulse, and mental powers being scarcely affected; and in this form it may continue long, or soon disappear, sometimes after very inefficient means of cure, or even without the use of any medicine. The liability of the disease to recur from slight causes — as errors of diet, intemperance, &c. — has sometimes given it an apparently *periodical* character, which, although contended for by some authors, is entirely accidental, or, at least, the consequence of a concurrence of several of its causes, at certain seasons or periods, especially in situations abounding in the sources of endemic maladies.

15. II. CAUSES.—i. The *Predisposing Causes* are indolence, dissipation, intemperance, and sedentary occupations, particularly those performed in a stooping posture, and with pressure on the hypochondria and epigastrium. Jaundice is not infrequent among the studious; and especially amongst those who are harassed by cares, disappointments, and the depressing passions, and whose nervous energies are exhausted. It seems also more frequent in hypochondriacal and hysterical persons, and those who neglect, or are deprived of, their usual active engagements. It is common to all ages and sexes. HEBERDEN found, that out of 100 successive patients with this disease, 52 were males. It is frequently met with in cooks, and bakers, and in workmen exposed to high ranges of temperature, or addicted to intoxicating liquors. In females, it is oftener observed during pregnancy, and after the cessation of the catamenia, than at other epochs.

16. ii. The most common *Exciting Causes* are the more violent mental emotions, as the sudden communication of distressing intelligence, fright, terror, rage, anger, grief, anxiety, despondency, losses and disappointments, jealousy, petulance, peevishness, and irritability of temper. I have known it to follow the communication of joyful intelligence. Particular kinds of ingesta, especially such as disagree with the digestive organs, as stale, unseasonable, and unwholesome fish; drinking cold fluids when the body is perspiring; cold applied to the feet and surface of the body after exertion, or during free perspiration; and the bites of animals, particularly those which are venomous; also occasionally produce jaundice, especially in those who have experienced a former attack. According to HOFFMAN, venereal excesses, and intemperance in the use of intoxicating liquors, are amongst the chief causes of the disease. Great debility and exhaustion of the nervous energies, and, as clearly demonstrated by Dr. CHEYNE and Dr. MARSH, mercurial courses, particularly when employed in hospitals and close apartments, sometimes occasion it. I believe, however, that mercurials are a cause, only when they are given to produce their specific effects, or, when the exhibition of purgatives has been neglected, when required. The prevalence of the disease during revolutions, invasions, sieges, and campaigns, has been remarked by many writers; and its occurrence after intemperance in eating or drinking must be familiar to all. The excessive use of coffee; austere, and acid, or unripe fruits; and, indeed, any error of diet, or deleterious substance received into the stomach; will sometimes produce it. The suppression of accustomed discharges and eruptions, and the retrocession of rheumatism and gout, also not infrequently occasion it.

17. When the pathological conditions of the biliary and digestive organs exist, with which this disease is most frequently connected, many causes, that under different circumstances would produce but little effect upon the system, will readily excite it. Severe pain, mental affections, an irritating purgative, or particular kinds of food, will sometimes be sufficient to give rise to an attack, especially when pre-existing disorders of the biliary organs is associated with great nervous exhaustion. Jaundice is not infrequently caused by obstructed circulation through the heart; and by a torpid state of the cæcum and colon, with accumulations of fæces and scybala in their cells. It often follows agues and other periodic fevers; and it then usually depends upon some one of the morbid states of the liver, already noticed. It often occurs in the course of bilious remittent fevers, and occasionally without any apparent diminution of the biliary discharge, and even with evidence of augmented secretion of bile. It is also often associated with dysentery, or with other diseases, as will be shown in the sequel.

18. III. The MORBID APPEARANCES most frequently found in persons who have died *with* jaundice, are the following: — *a*. The *surface of the body* generally preserves the same colour after death, as previously to dissolution. PORTAL and myself, however, have seen the intensity of colour diminished; and, in other instances, the skin of some subjects, who had never had jaundice, assume, after death, a deep yellow. The limbs are often flexible, and œdema of the extremities is not infrequent. The body is commonly emaciated. The serum in the œdematous limbs, as well as that in the internal cavities, is either of yellowish tint, or of a dark hue. The various structures are more or less tinged of the same hue, particularly the cellular, adipose, and serous tissues. The internal surface of the blood-vessels, and even the cartilages, tendons, periosteum, and bones, are sometimes also changed in colour. The muscles are often tinged, and softer and more flaccid than natural. MORGAGNI had re-

marked, that the substance of the lungs, heart, liver, kidneys, and spleen is often softened, and contains a yellowish, a greenish yellow, or reddish fluid; and subsequent observers have also noticed these appearances. Most of the *secretions* partake of the same tinge; and the serum of the blood is also similarly altered. The fluid effused into the ventricles of the brain and all the membranes, are thus changed; but the substance of the brain itself, and the humours of the eye, are generally of their natural colour.

19. *b*. The *liver* and its appendages, most frequently of all the viscera, present morbid changes. The liver itself has been found with all the lesions consequent upon every form of inflammation. It is sometimes greatly enlarged, its blood-vessels congested, its ducts engorged, and its structure softened, inflamed, deeply tinged, or suffused with bile, and containing one or more abscesses, or their remains, &c. At other times it is extremely pale, apparently devoid of blood and of biliary secretion, atrophied, hardened, scirrhous, and tuberculated. In one case it is changed to a white, parboiled state; in another converted into a fatty, steatomatous, tallowy, or adipocerous substance. Occasionally its ducts are loaded with green inspissated bile, obstructed by concretions of cholesterine or of resinous matter. In other instances they are entirely empty, or contain merely a little thin, pale fluid. Sometimes the surfaces of the liver adhere to the adjoining viscera, and collections of matter or large abscesses press upon them, or upon the bile ducts, or open into the latter, or into other parts. In a few instances the *hepatic veins* have been found more or less obstructed, or pressed upon by tumours or enlargements of adjoining parts. In one instance of jaundice connected with abscess of the liver, I detected inflammation of these veins, several of them being plugged up with lymph, or filled with pus. In rarer instances, hydatids are found in the liver, or attached to it. (See art. Liver.)

20. *c*. The *gall bladder* often contains *calculi*, the number and size of which are very various. When one only is found, it is usually very large. The gall bladder may be distended with *bile*: in this case the fluid is much changed; being generally of a deep green colour, or greenish black, thick and ropy, and sometimes containing granular matter. In some instances, the accumulated fluid is of a pale orange colour, and thin consistence. A portion of fluid of this description, which was taken from a subject dead of tuberculated liver, jaundice, and dropsy, was examined by Dr. Bostock, and found to consist of water, albumen, and a little colouring matter, without any of the usual biliary principles. Stoll found the gall bladder filled with a whitish serum. In other cases it is entirely or nearly empty. Sometimes marks of inflammation are observed in its coats. The last named author found them changed to a semicartilaginous state. Frank, Louis, and Andral met with ulceration of the internal surface, with softening of the coats of the gall bladder; and a similar case occurred to myself, where it contained gall-stones. Andral found it softened and ruptured. Excrescences into its cavity have been noticed by Bonet. Adhesions of it to the adjoining parts are occasionally observed. Its entire absence in this disease occurred to M. Bourgeoise; but this is merely a coincidence. In a case of absence of gall bladder in a patient at the Infirmary for Children, there was no jaundice; and similar facts have been observed by others.

21. *d*. The *biliary ducts* are frequently obstructed, in some cases by gall-stones, in others by the pressure of tumours in the pancreas, mesentery, pylorus, or duodenum. The common duct is not infrequently obstructed by scirrhous or other tumours in these situations. In this case, as well as when it contains calculi, the gall bladder, and the duct above the seat of obstruction, are generally greatly dilated, and filled with thick, dark-coloured bile. This dilatation sometimes extends more or less throughout the ramifications of the hepatic ducts. In a case which occurred in my practice some years ago, and where both the common and the pancreatic ducts were completely obliterated by their inclusion in a large, hard, or scirrhous tumour, developed between the root of the mesentery, and head of the pancreas, — this latter being remarkably enlarged, — the gall bladder contained about twelve ounces of this kind of bile, and the ramifications of the ducts through the liver were much dilated. The coats of the ducts sometimes exhibit marks of inflammation, — are ulcerated, thickened and indurated, and the calibre of their canals are much reduced. In some instances, the ducts are entirely obliterated, and reduced to a thin fibro-cellular cord. This obliteration I have seen confined in one case to the common duct, in another to the cystic duct. In the latter instance, the gall bladder was enormously distended with a deep green viscid bile: the obliteration of the duct must have been subsequent to the accumulation of the secretion in this reservoir. Stoll, Portal, Andral, and others observed a cartilaginous state of both the common and cystic ducts. Lieutaud, Ludwig, and Chapman found lumbrici in the common duct, in icteric patients.

22. *e*. The *stomach* is not infrequently seriously altered, particularly when the disease has been occasioned by intemperance, especially in the use of spirits. The pylorus in those cases is sometimes thickened, cartilaginous and greatly constricted (Stoll). — The *duodenum* is often, also, the seat of lesion, especially in the vicinity of the ducts. It is sometimes inflamed, thickened, softened, or indurated, ulcerated, and, in rare cases, apparently scirrhous. Tumors of various kinds have involved its coats, at the place where the ducts enter it, either entirely obliterating their apertures, or very greatly diminishing them. Oechy found this viscus remarkably dilated, so as to press upon the ducts. The *pancreas* is occasionally enlarged, scirrhous, or otherwise altered, — pressing upon, or obstructing, the ducts. Great enlargement of the *right kidney* has also produced this effect. The *spleen* is sometimes enlarged, or otherwise altered.

23. *f*. Alterations of the *vena portæ* are also met with in jaundice. M. Honoré found this vessel nearly impervious. It has been observed considerably enlarged throughout its ramifications, and congested with black blood. In a great number of icteric cases, the viscera adjoining the gall bladder are much stained by the exudation of bile through its coats. But this is an entirely *post mortem* appearance. — *Dropsical effusions* into the

various cavities are frequently met with, and occasionally coincident lesions in the *heart*, *lungs*, as well as in some one or more of the abdominal viscera.

24. It should not be overlooked, that each, or several, of the foregoing lesions have often been present without jaundice,— a circumstance which has led some pathologists to deny the origin of it in the presence of bile in the circulation; and that jaundice has existed in patients, in whom no organic lesion was detected after death,—an occurrence which has led physicians, since the times of HOFFMANN and MORGAGNI, to impute the disease, in some cases, to spasm of the biliary ducts, and induced others to view it as an occasional consequence of the accumulation in the blood of the materials of which bile is formed, owing to inaction of the liver. But there is every reason to suppose that undetected disease of the heart had existed in many of these, and had obstructed the return of blood from the liver.

25. In cases of jaundice, particularly in those of long standing, a yellow or greenish yellow tint, in different degrees, is usually observed in every texture and organ of the body, and in all the fluids and secretions, whether natural or morbid. The fat is usually of the deepest colour. The humours of the eye and the cornea are seldom or ever tinged. A case is, however, related in HORN's *Archives* (*Für Pract. Medicin.* b. vi. p. 341.), where they exhibited this change of colour. The yellow hue has rarely been detected either in the cerebral structure, or in the medullary tissue of the nerves; although instances have occurred to BARTHOLIN, MORGAGNI, and PORTAL, of its appearance in the former.

26. IV. OF THE PATHOLOGICAL RELATIONS OF JAUNDICE.—Jaundice is more or less intimately connected with one or other of the following pathological conditions: — 1. With an exuberant secretion of bile; — 2. With inflammation and abscess of the liver; — 3. With congestion of the liver and portal system; — 4. With chronic alterations of the structure of the liver; — 5. With spasm, or temporary obstruction of the gall ducts; — 6. With the passage or existence of gall-stones; — 7. With inflammation, obliteration, or compression of the biliary ducts, or gall bladder; — 8. With inflammation of the duodenum.

27. i. *Jaundice with Exuberance of Bile.*—This variety was first contended for by M. PORTAL, and afterwards by MM. CORNAC, ALIBERT, VILLENEUVE, and others. It has been referred to an excited state of the vital actions of the liver, particularly to the predominance of its secreting function. It is sometimes met with in temperate climates, during summer and autumn, especially those which apppoach nearest the tropics; but it occurs chiefly in warm or intertropical countries, and in those who live indolently and luxuriously or intemperately, or who are of a bilious temperament. It is generally preceded by supraorbitar headach, bitter taste in the mouth, loss of appetite, nausea, bilious vomiting, followed by a yellowish, or greenish yellow tint of the skin. The chief characteristic of this form of the disease is the absence of constipation, and the presence of bile in the evacuations, which are either natural, or more frequent than usual. I have seen it accompanied with slight bilious diarrhœa, with febrile action, or with a full or strong pulse. It may be presumed, that a portion of the bile is absorbed in this variety, during its course through the biliary passages, or through the intestinal canal, owing either to increased activity of the absorbing vessels, to the state of the bile itself, or to partial obstructions in its course through either of these parts. It is often complicated with dysentery, hepatitis, and bilious fevers, particularly in miasmatous and intertropical countries.

28. ii. *With Inflammation and Abscess of the Liver — Hepatic Jaundice*, SAUVAGES and CULLEN —*Icteritia Pyrexica*, ALIBERT.—Jaundice may accompany any form of inflammation in this organ, particularly when the internal structure is the seat of the morbid action. Although inflammations of the liver are so extremely frequent in India, yet jaundice is a comparatively rarer attendant on them there, than in this country. In Continental countries, this association of jaundice is very common. The rare occurrence of jaundice, as a symptom of hepatitis, in India, is perhaps owing to the liberal use of calomel in the treatment of hepatic affections. But it is when abscess forms in the liver, that we most frequently find jaundice supervene on hepatitis. In a very large proportion of the cases of abscess of this viscus, detailed by M. ANDRAL (*Clinique Médicale*, t. iv.), jaundice appeared;—and a similar frequency of connection has occurred in my own practice. Out of six cases of abscess of the liver to which I was called, in 1826 and 1827, in consultation, four had jaundice during some period of their progress, subsequently to the occurrence of the symptoms indicating the formation of matter.

29. In almost every case of jaundice from inflammation or abscess of the liver, the nature of the disease is very readily recognised. The symptoms of hepatitis are well marked, particularly the pain, uneasiness, and tumefaction in the right hypochondrium and epigastrium; the scanty, dark, or brownish urine; the dry cough; the pain in the right shoulder, clavicle, and side of the neck, or under the right scapula, &c.; and the full and frequent pulse, &c. (See LIVER —*Inflammation of*, and *Abscess of.*)

30. iii. *Jaundice from Congestion of the Liver — Intemperies calida, of* SENNERT — *Icterus a Plethora*, of F. HOFFMANN. — The connection of this state with jaundice has been admitted by SAUVAGES, GRIMAUD, BANG, PORTAL, CORNAC, and MANOURY. It is generally observed in persons of the bilious and sanguine temperaments, who live luxuriously or intemperately, and either pursue sedentary occupation, or are deprived of requisite exercise. It is chiefly to this and the preceding pathological states, that we are to refer the instances of jaundice, which take place from the suppression of the menses, or of accustomed discharges, particularly the hæmorrhoidal, and from the retrocession of gout and rheumatism. Active congestion of the portal vessels is connected with more or less plethora, and congestion, of all the vessels that convey blood into the vena portæ. The blood circulates with difficulty through the liver; and the bile, which is formed, generally in great abundance, owing to the highly venous state of the blood, often is retarded and accumulated in the ducts, during its course to the gall bladder or duodenum. Owing to this retardation or obstruction, a portion of it is absorbed, probably by the radicles of the hepatic veins, as they pass out of

the granular structure, where the biliary secretion is performed, and the ducts take their origin. It is obvious, that obstructions of the return of blood from the liver, owing to *organic lesion of the heart*, will also give rise to this form of the complaint, and that such occurrences are not rare.

31. iv. *With Chronic Organic Alterations of the Liver — Aurigo ab Obstructione*, Sauvages—*Icteritia Apyrectica*, Alibert. — In this form of the disease, the accession of the jaundice is generally very slow; the colour is livid or dusky, permanent, and often extremely deep, approaching sometimes a greenish or olive hue, forming the green or black jaundice of several authors. The organic alterations vary remarkably; consist of those already enumerated (§ 18. *et seq.*); and are often complicated with lesions of the adjoining viscera, or with dropsical effusions. In the majority of these cases, the bile seems either to be secreted with morbid properties, and to be conveyed into the circulation almost as soon as it is secreted; or, what appears still more probable from the morbid appearances very frequently detected, the materials of which bile is formed, are not combined by the liver, and converted into bile, but, having experienced the preparatory change, merely pass onwards from the granular structure of the liver into the radicles of the hepatic veins, and, circulating with the blood, tinge the textures of the body, particularly the rete mucosum. That there is sometimes no due secretion of bile, is shown by the secreting structure of the liver being often found either completely destroyed, or so altered, as not to admit of the demonstration of its peculiar texture; and also by the pale, straw-coloured, tasteless, and albuminous serum found in the ducts (§ 19.); or by their empty, atrophied, and pale states. This variety of jaundice is generally the consequence of intemperance, or of residence in miasmatous districts, or in warm climates. It is often observed in persons of middle age, or somewhat further advanced in life; and is preceded by chronic dyspeptic or bowel complaints; and by indications of disorder in the liver, often of many years' duration.

32. v. *Jaundice from suspended Function of the Liver, or from Spasm of the Ducts —Icterus a Spasmo*, Hoffmann.—That jaundice ever proceeds from spasm of the gall ducts, has been denied by several writers. Cullen, Powell, Andral, and Jourdan have, however, contended, that spasm of the ducts sometimes occurs, and produces the disease, especially in cases arising from mental emotions, and the irritation of the upper portion of the intestinal canal. Sudden mental affections, — as fright, terror, rage, anger, disappointment, excessive joy, — frequently occasion a most painful and oppressive sensation at the epigastrium, faintness or difficulty of respiration, and paleness of the countenance. This state is occasionally followed almost instantly, but always in a very short time, by yellowness of the face and surface of the body. In some cases, the functions of the brain are much disturbed, and a febrile state of the system takes place. In others, nausea, vomiting, &c., in addition to the icteric affection, are produced. In these, the moral affection influences the state of the nerves proceeding from the solar plexus; and hence the morbid sensations referred to the epigastrium. The slow depressing passions of the mind were also supposed, particularly by Villeneuve and Manoury, to occasion spasm of the ducts; and physical pain was considered by M. Portal occasionally to operate in a similar manner. When jaundice is connected with hysteria, epilepsy, or hysteralgia, Hoffmann referred it to the same cause. Even the bites of venomous reptiles were supposed by Mead and Bosquillon to produce icterus in a similar way. Bartholin, Lanzoni, and Van Swieten have imputed the rare occurrence of jaundice from the bites of dogs, or other animals, also to this circumstance.

33. Cases of this kind admit of a different explanation from that proposed by the above writers. It is more probable that violent mental emotions, and that sedative poisons taken into the stomach, or inserted into the tissues, suspend the organic nervous influence, and thereby arrest the functions of the liver, than that they occasion spasm of the ducts and adjoining parts. That this latter state, however, may occur, I will not deny, especially when nausea, retchings, or vomiting are added to the icteric affection, or when the duodenum is irritated in the vicinity of the ducts. The more or less complete paralysis of the biliary organs, produced, for a time, by the causes alluded to above, favours the absorption or passage of bile into the circulation, and the accumulation in the blood of the elements of which bile is formed.

34. The principal characteristics of this variety of jaundice are its rapid appearance and short duration. It is seldom deep, and generally is of a pale yellow, or bright yellow hue. It often disappears without the aid of medicine; and the treatment resorted to, in such cases, thus obtains a reputation it does not deserve.

35. vi. *With Inflammation and Obliteration of the Ducts and Gall Bladder.* — The ducts may be inflamed, and obstructed in consequence of the turgescence accompanying the inflammation, or as MM. Jourdan and Breschet have stated, of some degree of spasm attendant on it. The inflammatory action may also extend to the gall bladder, or be almost entirely limited to it. Inflammation and its consequences have been observed after death in one or other of these situations, both in connection with, and independently of, jaundice; and have most probably been induced by the irritating properties of the bile passing through the ducts, or by the extension of inflammatory action from the internal surface of the duodenum to that of the common duct. In either circumstance, the ducts above the obstruction may become dilated, although not to the extent observed after obstructions of a more permanent kind. If, however, the consequences of inflammation furnish a permanent obstruction, this result will often occur.

36. In cases of this kind, the patient has more or less fever, dry skin, thirst, and anorexia or nausea, or even retchings. Pain is felt in the right hypochondrium, particularly under the exterior and inferior angle of the right shoulder blade, extending to the epigastrium, on the right side of which, or beneath the extremities of the right false ribs, a pyriform moveable tumor is sometimes felt. The stools are without bile. More or less fulness of the right hypochondrium and epigastrium is also often present, sometimes with pain not only in the above situations, but also in the back, and in distant parts. These

symptoms may continue an indefinite period with various degrees of severity; and may subside with the jaundice after a time, upon the resolution of the inflammation.

37. In less favourable cases, owing to the thickening consequent upon the inflammation, or to the exhalation of coagulable lymph from the internal surface of the inflamed duct, together, perhaps, with spasm, its canal becomes permanently obstructed, and the vessel is ultimately reduced to a fibro-cellular cord. In these, the jaundice generally continues, and all the digestive and assimilating functions languish; death ultimately taking place.

38. vii. *Jaundice from Compression of the Ducts by Tumors, &c.* — The lesions of the adjoining viscera already referred to (§ 21.), particularly the formation of scirrhous and other tumors in the pancreas, pylorus, mesentery, &c. involving and obliterating the ducts; enlargement, and disease of lymphatic glands in the vicinity of the common duct; engorgement or inflammation of the pancreas, occasioning compression of this duct; great enlargement of the right kidney; distension of, or accumulations of hardened fæces in, the cæcum and colon; the gravid uterus, &c.; may occasionally interrupt the passage of bile into the duodenum, by pressing upon the ducts, and thus occasion jaundice. It is only by pressing scybala, or hardened fæces lodged in the cells of the colon, upon the duodenum and common duct, that the gravid uterus causes jaundice. It is extremely difficult to ascertain the presence of any of those causes during the life of the patient; although suspicions of the existence of some of them may be entertained from the *tout ensemble* of the symptoms, and the effects of remedies. When jaundice arises from accumulated fæces, the effects of purgatives will often demonstrate its origin. The frequency of this cause has been justly insisted on by Van Swieten and others.

39. viii. *Jaundice from Calculi in the Ducts — Aurigo Calculosa*, Sauvages. — Calculi lodged in the ramifications of the hepatic duct, may occasion, or rather be connected with, jaundice; but their presence in the common and cystic ducts is a more frequent cause. They are more rarely found in the hepatic duct, but they may produce the disease in that situation. Their impaction in the cystic duct, even when the gall-bladder is filled with dark bile, does not uniformly occasion this affection, as shown by numerous observers. When they obstruct the common duct for some time, this effect very generally, although not always, follows; and the symptoms, particularly when the calculus approaches to, or is passing through, the coats of the duodenum, are often very well marked. In many cases, however, calculi pass without giving rise to jaundice, or, indeed, to any very prominent symptom or ailment; and in others, they pass with violent sufferings, and yet no jaundice is occasioned.

40. More commonly the occurrence of jaundice from the impaction of calculi in the bile ducts, particularly the common duct, is attended with pain, weight, pressure, and uneasiness towards the epigastrium, especially when the patient lies on the left side. Acute, colicky, and spasmodic pains are felt at intervals in the region of the duodenum, under the right shoulder blade, and extending to the hypochondrium and epigastrium, followed sometimes with nausea, vomiting, and a sense of heat at the stomach. Occasionally, a tumor is detected between the epigastrium, hypochondrium, and umbilicus. When the fits of pain are violent, the patient often complains of vertigo, of the extension of the spasm to the abdominal muscles, and even to the extremities. There is seldom only one calculus, generally several; and the attack is often renewed upon the passage of each, with a varying degree of severity according to their size. The jaundice in these cases may precede, or even follow, the painful symptoms. Upon the discharge of the calculi, these symptoms quickly subside; but the jaundice disappears only slowly, or even persists for some time.

41. The production of jaundice by the presence of *worms in the ducts* has been stated by several authors, and doubted by others. Dr. Chapman refers to a preparation demonstrating the fact in the museum of the University of Pennsylvania.

42. ix. *Jaundice from Inflammation or Congestion, &c. of the Internal Surface of the Duodenum.* —Various deleterious ingesta, acrid salts and poisons, emetics, and purgatives, articles of food which offend the stomach, drinking cold fluids, &c. when the body is overheated, or exposure to cold, have been supposed by Broussais and his followers sometimes to occasion so much inflammation and turgidity of the mucous membrane of the duodenum and adjoining parts, particularly about the orifice of the ducts, as as entirely to occlude it, and thereby to give rise to jaundice. That this takes place in rare cases, or that congestion in this situation will have the same effect, may be admitted, although satisfactory proofs of the circumstance cannot be readily furnished. The inflamed and turgid state of the duodenum may be limited to it, or may even extend to the ducts, as stated above, and thus cause obstruction (§ 35.). The jaundice accompanying bilious fevers and dysentery may depend upon this pathological state.

43. It is probable that this variety of jaundice will be attended by very nearly the same symptoms, as characterise that proceeding from inflammation of the ducts; but that, unless the ducts become implicated, the jaundice will be less marked, and of shorter duration, than when they are inflamed. The presence of nausea, vomiting, or of diarrhœa, or of sympathetic phenomena, in such cases, furnishes but slight evidence of this pathological state. Oechy states that he has seen the duodenum dilated so as to press upon and obstruct the ducts, in a case of jaundice; but there was probably some other lesion upon which the jaundice more immediately depended than upon this.

44. Various other morbid states of the duodenum may occasion jaundice, particularly the accumulation of mucus on its surface, or about the orifice of the ducts; and various organic lesions seated in this part, or extending to it, or to the ducts from adjoining viscera. The former of these is probably not an infrequent cause of the slighter and less enduring kinds of jaundice, particularly in infants (§ 53.), children, and young persons.

45. V. Jaundice from Suspension or Arrest of the Secreting Function of the Liver — *Pseudo Jaundice.* — In this form of dis-

ease, which cannot be considered as a variety of true jaundice, bile is not secreted or formed from its elements in the blood, owing either to a paralysed or suspended state of the vital action of the liver, or to disorganisation of it to an extent entirely subversive of its functions. In either case, the elements, from which the bile is formed, accumulate in the circulation, change the colour of the serum and of the blood generally, and thus render the skin lurid or murky. In a further advanced stage of the disorder, certain of the principles, or even the colouring matter, of bile are fixed, or deposited, in the tissues, imparting to them either a darker, or a more jaundiced hue. (See art. Disease, § 108.) The slighter states of this form of disorder frequently accompany torpor of the liver, as observed in this country; and the more marked states of it often occur in miasmatous and warm climates. In various fevers also, and in some epidemics and pestilences, the action of the liver is entirely suspended; the surface becoming dark or lurid. This takes place to a remarkable extent in *pestilential cholera*, and is heightened by other circumstances.—When this state of disease arises from disorganisation of the liver, its accession is slow, and the discoloration of the surface often proceeds through a dirty or lurid hue to the greenish or greenish black colour about to be noticed. In either of the pathological states producing the discoloration, there is an entire absence of bile from the stools; and the secretions from the kidneys and skin are dark, or otherwise altered, from the presence of the elements or of the principles of bile.—When the vital power of the organ is suspended, there is seldom pain or other prominent symptom detected in the region of the liver. There is even sometimes an unusual absence of symptoms indicative of acute hepatic disease, excepting the complete suspension of the functions of the organ. But when the structure of the viscus is so altered, as to be incapable of discharging its offices, the antecedent disorder, as well as the attendant phenomena, will generally indicate the pathological relations of the affection, aided by the history of the case, and a knowledge of the causes. The alterations of the liver, already noticed in connection with true jaundice (§ 19.), will occasionally, when carried to the highest pitch, give rise to this form of the disease, or to the next to be noticed (§ 46.).

46. VI. Of Green or Black Jaundice—Μελαίνα νοῦσος, Grec.—*Icteritia nigra*, Forestus — *Icterus viridis*, *Melas Icterus*, *Melanchorus*, Fennel, et Var. Auct.—*Icterus Melæna*, Good — *Green Jaundice*, Baillie — *Black Jaundice*. — This is merely the extreme grade of the disease. It was first described by Aretæus; but although somewhat circumstantially noticed by several authors, the first satisfactory account of it was furnished by Dr. Marcard and Dr. Baillie. The colour of the skin varies in depth from a yellowish green, to a deep green or olive colour. The temperature of the surface is not increased; but burning heat is felt in the palms of the hands, and soles of the feet. The evacuations are often pale; but sometimes they are dark coloured, pitchy, with grumous coffee or chocolate like matter, and slight diarrhœa. The urine is occasionally clear, but oftener very dark and loaded, tinging the linen of a dark, tawny hue. The patient is greatly depressed, physically and morally, and complains of anxiety at the epigastrium, and of tenderness either in that situation, or in one or both hypochondria. A sensible enlargement of the liver is often felt, and sometimes also of the spleen. In a case which I lately treated, both these viscera were very remarkably enlarged. But an opposite state as frequently obtains. The pulse is usually natural or slow. Vertigo, sickness, and vomiting of a green, acid colluvies, occasionally are present. In the intervals, the appetite is either capricious, or but little affected.

47. This form of jaundice seldom attacks young persons. It is commonly met with in the aged or advanced in life, and is much more frequent in males than females, particularly in those who have lived long in unhealthy intertropical countries, or who, with great anxiety and fatigue, have been tried by frequent changes of climate. It is generally connected with the most chronic and profound organic lesions of the liver, especially those which involve, or destroy, its secreting structure, and obliterate the minuter ramifications of the ducts through the organ. It seldom admits of more than a partial removal, but terminates in either a fatal exhaustion, or with coma, apoplexy, epilepsy, or palsy. Abdominal dropsy frequently takes place in its progress. Its course, in its slighter grades, is generally slow,—sometimes continuing, with various fluctuations, for seven or eight years; but when the colour becomes very deep, it often terminates rapidly, in either of the above ways.

48. When green jaundice is attended with pitchy, or dark, grumous evacuations, there is generally either a congestion of the spleen, and of the portal system of vessels, with the secretion of a dark-green unhealthy bile, a portion of which is absorbed, and deposited in the structures, particularly in the *rete mucosum*; or a congested and hæmorrhagic state of the mucous membrane of the stomach, duodenum, and upper part of the intestines, owing to the obstructed circulation through the liver; but both pathological conditions may be present, giving rise to an exhalation of venous blood from this membrane, and thereby to the dark and grumous motions. The mucous membrane in these situations is usually found, on dissection, dark-coloured, mottled, softened, ecchymosed, or its venous capillaries loaded. The other viscera, particularly the *liver* and *ducts*, present the appearances already described (§19, 20.).

49. VII. Complicated Jaundice. — By this appellation, I mean the occurrence of jaundice — 1. during the course of some other disease; and, 2. upon the subsidence or suppression of a pre-existing disorder, which may not only be concerned in its appearance, but also in its removal or recurrence. — *A. The maladies during the progress of which jaundice most commonly occurs*, are chiefly those fevers which implicate, in a more or less marked manner, the liver and digestive mucous surface. Thus it is frequently observed in the course of *gastric*, and of *bilious remittent fevers*, of both an inflammatory or low character. It is also not infrequent in connection with *ague*; and, owing partly to this circumstance, it has been said by some authors to recur *periodically*. Its appearance in the course of *typhus fevers* is

comparatively rare. MENDE has sometimes remarked it; and CHEYNE notices its infrequency. When it occurs during *fevers*, it may be imputed either to diminished excreting activity of the liver, and the rapidity of absorption of a portion of the secretion, or to obstruction in the way of the opening of the ducts into the duodenum, from a tumefied, congested, or inflamed state of its mucous surface. In some cases, both states may contribute; whilst in others, the secretion takes place more rapidly than it is conveyed into the bowel, although its flow is in no respects impeded. The secreting function of the organ may also be much diminished, — the constituents of bile being left in the blood.

50. We occasionally also observe jaundice in connection with *organic lesions of the heart*, *hysteria*, *dropsy*, *melaina*, *delirium tremens*, *apoplexy*, *palsy*, and *epilepsy*. — When it is complicated with *hysteria*, the urine is usually very abundant and limpid, and the complication is of a much less serious nature, than with the other maladies just named, which more frequently terminate unfavourably, when thus associated. — When it occurs in consequence of interrupted circulation through the heart, dropsy, or hæmorrhage, often also supervenes. We also not infrequently hear of it in connection with certain *cachectic* and *malignant affections* of a chronic character. Several of the states, which are usually attributed to jaundice, in the last stages of these maladies, are not true jaundice, and do not proceed from the presence of bile, or of its constituents, in the circulation; but from the absorption, and admixture with the blood, of a portion of the morbid matters formed in the seat of the local or malignant affection, or of some of the morbid secretions retained in the digestive canal (§ 54.).

51. *B.* Jaundice sometimes follows the subsidence or suppression of other diseases, and is even removed by the reproduction of certain of them: it often appears after periodic fevers, and occasionally upon the sudden arrest of these fevers by large doses of cinchona or of sulphate of quinine, especially when these are exhibited before morbid secretions or accumulations have been evacuated. In such cases, the jaundice depends chiefly upon superinduced congestion or inflammation of the internal structure of the liver. The stoppage, also, of *hæmorrhoids*, sometimes gives rise to jaundice, by inducing these morbid conditions of this organ; the re-establishment of the hæmorrhoidal flux generally removing the congestion, and favouring resolution of the inflammatory action. A similar result occasionally occurs from obstruction of the catamenia, and from suppression of dysentery, diarrhœa, of gout, and of rheumatism, especially when morbid secretions, and collections in the digestive canal, have not been removed. The relation of gout to several of the pathological states which give rise to jaundice, and the conversion, in some instances, of the one into the other, have been remarked by several experienced physicians; and a similar connection has been noticed between this latter and the other diseases just named.

52. VIII. TRAUMATIC JAUNDICE. — Jaundice sometimes occurs after concussion of the brain, and severe injuries of the head. The influence which the brain exercises on the functions of the liver, has been oftener the subject of remark than of explanation. It has usually been imputed to sympathy; or, in other words, the morbid relation has been stated, and our ignorance of its nature admitted at the same time. Severe injuries, when they suspend the energies of the brain, may also lower the secreting and excreting functions of the biliary apparatus, by diminishing its nervous energy, and placing it in a state which (§ 33.) favours the absorption of bile into the circulation, independently of any very obvious change in the structure of the liver or ducts. There is, however, every reason to suppose that jaundice subsequent to severe injuries, particularly of the head, sometimes results from phlebitis, originating in the seat of injury, or from the passage of purulent or other morbid secretions thence into the circulation. In either case, purulent collections will sometimes form in the liver, and give rise to jaundice by pressing upon the hepatic ducts and veins. Severe injuries in other situations than the head, — as compound fractures, &c., — will sometimes also produce the same results. That purulent collections form in this viscus, under these circumstances, almost as frequently as in the lungs, is a fact fully established by the observation of the author, and other pathologists; and although jaundice is not a constant, yet it is a very general, attendant upon them. — Injuries, wounds, &c., which implicate any part of the biliary apparatus, occasionally produce jaundice, by the immediate change they induce in the functions or structure of it; and it is not unlikely that, in some of the instances where the injury seemed to have been inflicted on the head, the liver actually had sustained the chief injury, or had experienced a concussion, of which jaundice was the consequence, either with, or without, inflammatory action diffused through the substance of the organ. — When jaundice follows blows or injuries on the region or vicinity of the liver, and especially if it be attended by a dull or aching pain, inflammation extending through the substance of the organ may be inferred to exist.

53. IX. INFANTILE JAUNDICE — *Icterus Infantum* — *Icterus Neonatorum* — *Yellow Gum*. — Jaundice is usually slight during the infantile age. It is generally attended with languor, drowsiness, or debility; and may be referred to the following pathological states: — 1st. To the stagnant and altered blood contained in the umbilical vein, changing the state or colour of the serum; — 2d. To a partial absorption, from retention of the meconium; — 3d. To saburræ accumulated in, and absorbed partially from, the duodenum and small intestines; — 4th. To obstruction of the aperture of the ducts from viscid meconium, and mucous sordes; — 5th. To spasm of the excretory biliary ducts (BEAUMES); — 6th. To a superabundance of the biliary secretion: — and, 7th, To obstruction, or a paralysed state of the secreting structure of the liver. The first, second, and third of the above sources may so change, or deepen the colour of, the serum of the blood, independently of any absorption of bile, as to give rise to the yellow state of the cutaneous surface frequently met with in infants. — Superabundance of the biliary secretion may exist in more than one respect; — this fluid may be secreted in unusually large quantity, or it may have accumulated in the ducts and gall bladder during the period immediately antecedent to birth, or it may have flowed into the duodenum in very large quantity, and

mixed with the secretions of the digestive mucous surface, forming a meconium, abounding more than usual in biliary principles, instead of the bland albuminous fluid, which is usually formed for the purpose of assisting fœtal nutrition and growth.— A paralysed state of the secreting structure of the viscus has been ascribed by M. BEAUMES to injury sustained by the brain during child-birth, but it may exist independently of this cause. One or more of the above pathological states may give rise to jaundice in infants, which is generally mild, and readily removed by medicine. It usually occurs very soon, or within the first week, after birth, particularly when the bowels have been neglected; but it may appear at any period. When it comes on within the first week after birth, it seldom continues above four or five days, and is usually slight.

54. X. OF CACHECTIC OR SPURIOUS JAUNDICE. — Morbid secretions readily pass into the circulation in the course of various malignant, pestilential, and cachectic maladies, and impart a dark or dirty hue to the serum, and otherwise affect the blood, producing a similar tinge in most of the tissues, — the cutaneous surface closely approaching the colour of jaundice, but differing from it, in being more lurid and dusky, and in the absence of biliary obstruction. In low states of vital power, morbid secretions may be absorbed from the digestive canal, and thus affect the circulating fluids; and in a similar state of vital power, secretions or morbid matters in other situations, as from the uterus in the puerperal state, from abscesses, from disorganisation of the cellular tissue, &c., may pass into the circulation, and impart a lurid or jaundice-like tinge to the external surface and other parts. The contamination of the fluids and soft solids in the latter stages of chronic malignant maladies, as carcinoma, fungoid disease, is also attended by a change of the cutaneous surface resembling jaundice, but essentially differing from it. For the hue of the skin in these maladies proceeds from the admixture of morbid matters absorbed from the seat of local mischief, vitiating and tinging the serum of the blood of a deeper hue, and thereby rendering darker the *rete mucosum*; and not from the presence of bile, or even of its chief constituents, in the circulation (§ 63. *b.*). The lemon, yellowish, or even the yellowish green hue of jaundice, is very different from the lurid, dirty, or murky appearance of the surface consequent on these maladies. In these, the pale or clayey state of the stools, and the saffron tinge communicated by the cutaneous and urinary secretions in jaundice, are wanting, whilst the alvine evacuations are usually dark, morbid, and very offensive.

55. The appearance of the cutaneous surface in *chlorosis* resembles a slight attack of jaundice; and it is necessary not to mistake the one for the other. This will be avoided by attending to the age, the functions of the uterus, and to the evacuations. In chlorosis, the discharges are more natural than in jaundice, the perspiration and urine not communicating to the linen the saffron tinge observed in the latter complaint. In chlorosis also, and, indeed, in the latter stages of chronic malignant diseases, the waxy state of the integuments, and the smallness of the vessels, indicate a deficiency in the quantity, as well as in the quality, of the blood.

56. Instances, however, may occur, in which the morbid colour of the surface is increased in the course of cachectic and malignant maladies, by the absorption of bile into the circulation, or by the accumulation in it of the elements or principles of which bile is formed, owing to torpor of the liver. Indeed, this latter cause of heightened discolouration of the surface, in the course of these maladies, is by no means rare; for the liver largely partakes of the depressed state of vital power characterising them. When malignant disease occurs either in the substance of the liver, or in parts near the capsule of GLISSON, it is generally associated with jaundice, which gradually deepens from a lemon hue to a dark or dusky green colour, the urine assuming a greenish brown tint, and the patient sinking from exhaustion and coma. This association has been well illustrated by the recent researches of Dr. BRIGHT, which have appeared since this article was written.

57. XI. OF THE DISTINCTIONS MADE BY AUTHORS.—Jaundice has been variously *distinguished* — into *Idiopathic* and *Symptomatic*; *continued* and *recurrent* or *periodical*; *febrile* and *non-febrile*; and into *Yellow* and *Black Jaundice* — *Icterus* and *Melasicterus*. It has been further distinguished into *Inflammatory*, *Plethoric*, and *Nervous*; into *sporadic*, *endemic*, and *epidemic*; into the *mild* or *benign*, and the *malignant* or *pernicious*. —Jaundice is generally *sporadic*; but it is *endemic* in some localities, particularly in those which are low, humid, and warm; and which abound in terrestrial exhalations, as in some situations in the South of Europe, and among Europeans residing in various parts within the tropics, particularly in the Eastern hemisphere. It has likewise been so prevalent at some periods, especially in autumn and early in winter, even in temperate countries, as to have been considered *epidemic*.

58. *The malignant* or *pernicious* form of jaundice, noticed by writers, sometimes occurs in warm climates, and in marshy districts in the South of Europe, particularly during autumn, when low remittent or bilious fevers are prevalent. It entirely depends upon a general or diffused inflammation, or inflammatory congestion, of the liver, or both of the liver and spleen, with retention of the biliary and other secretions, great depression of vital power, deep or dark green discolouration of the skin, very quick pulse and febrile disturbance, terminating rapidly, sometimes with intestinal hæmorrhage, and always with delirium and profound coma. This form of jaundice is not, however, confined to the climates and localities just specified; as I have been called, within a short time, to two cases in London, which presented all the characters of the most *pernicious* state of the disease, and which terminated fatally in four or five days.

59. *Idiopathic* or *primary jaundice* has been denied, first, by BOERHAAVE and STOLL, and subsequently by PINEL, LOUYER VILLERMAY, GRIMAUD, and others; whilst it has been contended for by numerous writers. The truth is, that the difference between idiopathic and symptomatic, particularly as relates to jaundice, is often merely verbal, and is in a great measure relative. In a very strict sense of these terms, jaundice is never a primary complaint; whilst it may frequently be viewed as such, if we consider it, with many other maladies, as constituting the principal, and one of

the earliest morbid conditions, which can be recognised by our senses. According to this more obvious mode of distinction, the occasional occurrence of idiopathic jaundice, as after mental emotions, cannot be disputed. The variety usually attributed to spasm of the ducts, but which I have considered as depending rather upon a change in the state of organic nervous influence and functions of the liver than upon spasm, may, conformably with this view, be considered idiopathic.

60. The *classifications* and *distinctions of jaundice* by nosologists and authors require no further notice. Indeed, they do not deserve the space they would occupy, especially as SAUVAGES adduces *forty-six species*, arranged, according to the various causes, pathological states, and associations, which the complaint presents. Even VILLENEUVE has divided it into *thirteen species*, several of which are subdivided into many *varieties*, which do not admit of any distinction in practice.

61. XII. PROGNOSIS.—The prognosis necessarily varies with the age, sex, temperament, and habit of the patient, and the pathological relations and complication of the disease. — *A*. It is generally more *favourable* in young, than in old, subjects; and in those, in whom the energies of the frame are sufficient to bring about a return to the healthy functions, than in persons of a broken-down constitution, and with disorganised viscera. If it occurs in females from plethora, occasioned by the suppression of the menses, previous to the climacteric period; if the health has not been previously much affected, — if the abdominal viscera betray no marked disease, — if the respiratory function is unembarrassed, the heart's action regular and natural, and the vital energies not materially depressed; if the colour does not progressively deepen; if it proceed from the sudden, and violent emotions of the mind, as anger, fright, &c., or from bodily pain; if it arise from articles of diet or of medicine, which have disagreed with the digestive organs; if it depend upon plethora of the portal system, without inflammation or abscess, or on the passage of calculi along the ducts, in persons not far advanced in age, nor greatly debilitated; if a repelled eruption or suppressed discharge return; if the alvine evacuations are not much changed from their natural colour, or when the biliary secretion reappears; if the discolouration originate in temporary obstruction or pressure on the ducts, as in pregnancy, distension of the duodenum or colon; if the epigastrium and hypochondria are not constantly painful, or tender upon pressure; and if the disease seems to proceed from the more temporary causes of obstruction in the duodenum, or from spasm; the prognosis may in general be *favourable*; — yet I have seen jaundice exist in these circumstances, and where there seemed no reason to infer an unfavourable issue, and coma has suddenly appeared, and quickly carried off the patient.

62. *B*. An *unfavourable* prognosis, on the other hand, or, if not strictly unfavourable, a very guarded opinion, should be given, when this affection occurs after the cessation of the menstrual periods, or in aged females, or when it is caused by debauchery and intemperate indulgences, particularly in spirituous liquors. If symptoms of organic lesion of the viscera attend it; if the epigastrium and hypochondria be tumid, tender, and constantly painful, with heat of the palms of the hands and soles of the feet; if the respiratory function be impeded, or the circulation through the heart be irregular or obstructed; if the energies of life be depressed; if chronic disease have preceded the discolouration of the surface; if the colour deepen, be of long standing, and particularly if it be of a dark green hue; if it take place from the continued operation of the same cause, as grief, anxiety, and the depressing emotions; if the urine be small in quantity, white, or albuminous, or very dark, turbid, thick or blackish; if there be indications of supervening dropsy; if a colliquative form of diarrhœa supervene, or very dark, grumous, or pitchy evacuations, or vomitings of a nearly similar matter; if the affection be of long duration, and particularly if it be associated with dropsical effusions; if hiccup, with tumefaction of the epigastrium and hypochondrium, or a tympanitic state of the abdomen, be present; if delirium, delirium tremens, mania, epilepsy, lethargy, coma, paralysis, convulsions, or apoplexy occur; if intestinal hæmorrhage, or hæmatemesis, take place; if the jaundice proceed from calculi in aged persons, or appear after repeated attacks of ague or remittent fevers, and from continued melancholia; if it be accompanied with great depression of the mental and physical powers; if marked cachexia, and great emaciation, be present, and especially if it be complicated with internal or external malignant disease, a very unfavourable prognosis should be given.

63. XIII. REMOTE and PROXIMATE CAUSES. — The chief causes have been stated in what has been advanced respecting the pathological relations of jaundice. — *a*. It is obvious, that the more *remote* causes are those which induce the alterations, of which the discolouration is a symptom. These are fully detailed above (§ 15.), and in the articles CONCRETIONS — BILIARY; DUODENUM; GALL BLADDER AND DUCTS; and LIVER — *Diseases of*. Those, which most frequently induce this complaint, are — habitual excitement of the liver, duodenum, and digestive organs generally, by too rich, too stimulating, or too much food, or by spirituous or intoxicating beverages; sudden and violent mental emotions; anxiety, or the depressing passions; high ranges of temperature, indolence, and full living; vicissitudes of temperature; the ingestion of cold fluids when the body is perspiring; miasmata or exhalations from the soil, especially in connection with humidity of the air; suppressed discharges and accustomed evacuations; interrupted circulation through the heart, occasioning congestion in the vena cava and hepatic vein; previous disease, particularly periodic fevers, &c.; whatever depresses the energies of life, and at the same time favours internal visceral obstruction; and the organic changes already noticed.—*b*. The *proximate* cause of jaundice may be stated to be the passage of the colouring or other principles of bile into the circulation, and the consequent discolouration of the skin and other tissues, heightened in some of the varieties by the accumulation in the blood of the elements of which bile is formed.

64. XIV. TREATMENT.—There are few diseases which require so much discrimination, as to the *indications* and *means of cure*, as jaundice. It

proceeds in different cases, as shown above, from so many different pathological states, and sometimes from so many combinations of them, that the utmost attention and practical acumen are necessary to ascertain the morbid conditions and peculiarities of the case, and to determine what is most efficacious in removing them. It is requisite not merely to guard against vascular excitement on the one hand, and vital depression on the other; but in many cases, also, to prevent or to remove both, as being the more immediate causes of the obstructed secretion or excretion of bile. In all cases, the states of general and local organic nervous power, as well as of general and local vascular fulness or action, must claim particular attention; and, in many, it will be found requisite to aid the former, whilst we diminish the latter. In any circumstances, it is very difficult to ascertain what are the effects of remedies upon the circulation and functions of the liver; for much of what has hitherto been said and written upon the subject, has been characterised by dogmatism, rather than by truth, — by vague assertion, unsupported by evidence. Some of the medicines, which have been supposed to excite the liver, probably operate by removing slight obstructions from the mouth of the common duct, by reducing vascular turgescence in the duodenum, and carrying off mucous collections; and others, which have been viewed as inert, as respects this organ, have as great influence upon its functions, as those whose effects have been considered specific. The operation of medicines in affections of the liver so much depends on the state of vital activity and of vascular action, on the extent to which biliary collections may have formed, and on the facilities to its excretion, that facts are rarely observed with that degree of precision in all these relations, which should entitle them to confidence, or to be made data for practical inferences.

65. i. *Jaundice from an exuberant Secretion of Bile*, there being no evidence of its obstruction, is not so frequent in this, as in miasmatous and warm climates. In these especially, the treatment must have due reference to the remote causes, and to the more immediate source of the biliary exuberance. In temperate climates, and in European constitutions, this state of the biliary function is connected with biliary remittent fever, and is most appropriately treated by the means most serviceable for the constitutional affection; but it sometimes continues, or returns, after the fever has disappeared. In these cases, as well as in those where it presents a more idiopathic character, there is every reason to infer the presence of active circulation in, or vascular determination to, the liver, probably with increased activity of the absorbent function. For them, moderate *local depletion* from the margins of the ribs, or from below the shoulder blades; *cooling diaphoretics*, especially the nitrate of potash, the solution of acetate of ammonia, or subcarbonate of soda, and spirits of nitric æther in camphor mixture; *emollients* and *demulcents*; soothing enemata and *diluents*; are the most efficacious means, particularly when the causes no longer exist, or when the patient is removed from the influence of miasmatous exhalations, or enjoys a dry and pure air.—The *diet* in these cases should be very spare, and consist of mucilaginous and farinaceous substances; animal food should be taken sparingly and cautiously during convalescence, and stimulating beverages entirely relinquished.

66. ii. *Jaundice from Inflammation of the Substance of the Liver* is more frequent than is generally supposed. It is often merely an exalted state of the former variety; the vascular disorder having advanced to such a pitch, as to obstruct the secretion or excretion of the bile, owing to the general turgescence of the vessels, and consequent pressure on the minuter bile ducts; and it is most frequently observed, when the internal structure of the organ is generally inflamed, or is the seat of one or of several abscesses. (See LIVER — *Inflammation of.*) When the attack is *slight*, and is attended by little pain, or by pain increasing slowly after pressure; and when there is little fever, the pulse being oppressed, rather than much accelerated; *local depletions* from the margins of the ribs, and from the anus, with the other means just advised (§ 65.), will generally remove all disorder. But when the bowels are costive, additional means will be required, especially *mercurials* with antimony; *saline medicines*, either alone, or with other *aperients*; a solution of sulphate of magnesia in camphor julep, with the solution of the acetate of ammonia, and spirits of nitric æther; the warm turpentine epithem applied over the epigastrium; the warm bath, &c.

67. In the more *acute cases*, particularly when there are much fever, intensely deep jaundice, very quick pulse, dry tongue, flushed countenance, and scanty, dark urine, the treatment should be most actively antiphlogistic. — General *bloodletting* ought to be early employed, and be followed by local depletion; by full doses of *calomel*, or of calomel with *James's powder*, camphor and opium; by *saline aperients*; by *antimonials* and saline *diaphoretics*; and by the rest of the means advised in the article on *Inflammation* and *Abscess* of this organ. In all such cases, the treatment should vary according to the history of the case, particularly in respect of previous disease of this viscus, and to the habits, age, and other circumstances of the patient. If the treatment be not active at the commencement, and in some instances where it has been both active and judicious, delirium and coma will supervene in four or five days, or even earlier, if vital power be exhausted, and if the discolouration be very deep. In this stage, treatment will seldom be of much avail. The propriety of then having recourse to depletion will entirely depend on the strength and frequency of the pulse, on the state of the hepatic regions, and on the means previously employed. In some, local depletions may still be resorted to; but, in all such, camphor with other mild restoratives will be appropriate. Calomel will seldom be of any use at this period, if it have been already liberally prescribed. If it have not been employed, it may be given with camphor. Some benefit may accrue from an occasional exhibition of a draught containing spirit of turpentine with, or without, castor oil; from the same substances administered in enemata, from the warm turpentine epithem applied over the epigastrium and hypochondria, and from a large blister on the nape. When jaundice is dependent upon abscess of the liver, the

treatment must be conducted as advised for this state of disease, in the article Liver.

68. iii. *Jaundice from Congestion of the Portal and Hepatic Veins* often requires very nearly the same treatment, as just recommended for the slighter states of the preceding variety (§ 66.). — *Local bloodletting* is generally sufficient; and, unless in cases where the congestion depends upon dilatation of the cavities of the heart, the application of leeches to the anus is preferable to cupping over the hypochondria. If the congestion is connected with a stoppage of the hæmorrhoidal flux, leeches are especially serviceable. When congestion is chiefly in the hepatic veins, the circulation through the heart and lungs is often interrupted, and the congestion soon extends to the portal system, to the mesenteric veins, and the digestive mucous surface; the early stage of jaundice being characterised by a bloated appearance of the face, sometimes with lividity of the lips, and a deficiency, merely, of the bile in the stools. In these cases, the treatment should be chiefly directed to the primary complaint, and be modified according to the evidence furnished of the cause of obstruction. (See Heart — *Organic Lesions of.*) — When *hæmorrhage* from the digestive or respiratory mucous surface occurs in this variety, as sometimes observed, *cupping* from the sternum, or leeches applied to the anus, will be of service. In many cases of this kind, the liver is more or less enlarged, owing to the prolonged congestion; and, although there can be but little expectation of a permanent restoration of this organ to its functions, whilst the obstruction to the circulation continues, deobstruent and saline *purgatives* will generally be useful, especially mercurials, the bitartrate of potash with the sub-borate of soda and confection of senna, the preparations of taraxacum with soda, and the hot turpentine epithem placed on the abdomen, &c. — *Dropsical effusion* sometimes takes place in the advanced course of this form of jaundice, and requires *diuretics*, in addition to the decided exhibition of the medicines just named. The internal and external use of the spirits of turpentine; the compound decoction of broom with the acetate of potash, or with carbonate of soda, and spirits of nitric æther; weak solutions of the hydriodate of potash, or the solution of potash; occasionally the more drastic or hydrogogue *purgatives*; and a course of deobstruent *mineral waters*, such as those of the Beulah Spa, of Cheltenham, Pullna, Seidschutz, &c.; will sometimes be of service.

69. iv. *Jaundice from Chronic Organic Lesions of the Liver* requires a treatment modified according to the history of the case, and the signs furnished by a careful examination of the hypochondria, and even of the lower regions of the thorax. If the patient have had attacks of acute or subacute hepatitis or dysentery, or is subject to chronic dysentery or diarrhœa, very probably the circulation through the extreme branches of the portal vein, and the passage of bile along the small ducts, are obstructed by a deposit of albuminous lymph from the inflamed vessels in the areolæ or reticulations of the connecting cellular tissue of the organ, and by the pressure on these vessels thereby occasioned. In cases of this kind, more or less enlargement of the liver may be detected, especially in those which are less chronic; although, in the more protracted, the liver may have regained its former size, or have become even smaller, its structure being dense, granulated, or otherwise changed. In these latter, the nutrition of the organ, as well as its functions, is impaired; and the deposits formed in the substance of the organ become organised, or partially identified with it, and perpetuate the obstruction. In this variety, particularly in the less prolonged instances of it, the *exciting causes* of the hepatic disorder should be avoided. — *Diet* and *regimen* will very much assist the treatment. Stimulating food and drink should be relinquished, and *deobstruents* and *alteratives* adopted. If any remains of inflammatory action still exist, *leeches* should be applied to the anus, or to the epigastrium. In any circumstances, Plummer's *pill* should be taken regularly at bedtime, either alone, or with a little *soap* and extract of *taraxacum* (F. 503. 511.), and the *bitartrate of potash*, with the *sub-borate of soda*, in any vehicle, or with other medicines, according to the state of the bowels (F. 89. 96. 98.).

70. If *evacuations of blood* from the bowels occur, the *hydrargyrum cum cretâ* with *ipecacuanha*, enemata containing *spirit of turpentine*, or an occasional draught with this substance and castor oil, or the *nitric* or *nitro-muriatic acids* in the simple infusion of roses, will be useful. In all cases, frequent *frictions* over the hypochondria and epigastrium with an oleaginous and deobstruent *liniment* (F. 297. 311.), or with this conjoined with the mercurial liniment, will be of essential benefit. This variety, like the preceding, is very apt to become complicated with *anasarca* or *ascites*, or with both. In this case, the decided use of *mercurials*, the more drastic and hydrogogue *purgatives*, the bitartrate of potash in large doses with borax, *diuretics*, and the other means noticed above, and advised for Dropsy, proceeding from disease of the liver, will be requisite. Assiduous frictions of the hypochondria and abdomen with *liniments*, particularly with these just mentioned, or with those containing the *iodide of potassium*, and a course of deobstruent and purgative *mineral waters* (§ 68.), will sometimes be of use.

71. v. *The more doubtful Source of Jaundice in Spasm of the Ducts* requires means which have a stricter reference to the remote causes, and to the symptoms peculiar to the case, than to the existence of spasm. A large proportion of the cases usually attributed to this state, most probably would have been found, upon a more accurate investigation, to belong either to congestion of the hepatic veins; or to calculi lodged in the ducts; or to obstruction of the mouth of the common duct, arising from the states of the duodenum; and they consequently would have required a similar treatment to these. The affection attributed to the ducts may have been almost entirely confined to the duodenum; the means found of service, as *calomel* alone, or with *opium*, saline or other *purgatives*, *anodynes*, *emetics*, &c., instead of acting upon the former, actually removing the disorder of the latter, or carrying off mucous sordes from its surface, or subduing vascular turgescence from around the opening of the common duct. — When there is any reason to suppose that the reputed spasm of the ducts is actually a paralysed state of the organic nervous influence of the liver and ducts, *restorative means* will then be required. The

chlorate of potash with carbonate of *soda*, gum *ammoniacum* with Castile soap, the nitric or *nitro-muriatic acids* given internally, or the nitro-muriatic acid lotion or bath, *frictions* with stimulating liniments on the hypochondria, the ammonical and mercurial *plaster* in this situation, and *blisters*, will be severally beneficial in cases of this kind, as well as in the immediately preceding variety, when the energies of life are much exhausted.

72. vi. *Jaundice from Obstruction of the Ducts* (§ 35.).—When the obstruction depends upon the *passage of calculi*, as evinced by the symptoms noticed above (§ 39.), and more fully described in the article, CONCRETIONS — BILIARY (§ 6.), the means fully detailed in that article (§ 14.) should be resorted to, especially full doses of *opium*, alone or with antimony, of *belladonna*, or of other narcotics; the *warm bath*, warm *fomentations*, or the *turpentine epithem* on the abdomen, &c. No advantage, but rather mischief, results from the exhibition of mercurials in this state of the disease. When the obstruction arises from *compression, inflammation, and obliteration of the ducts* (§ 38.), in some part of their course, or even near their entrance into the duodenum, as from malignant tubera or other organic changes in the liver, or in the vicinity of the capsule of GLISSON, and from the organic lesions of the duodenum and pancreas already noticed, Dr. BRIGHT considers that the evacuation of fatty matter in the stools is not infrequent, especially if the biliary obstruction is permanent. In these cases, jaundice assumes a dirty or dark green hue, and is but little benefited by treatment; emaciation, exhaustion, hæmorrhage from mucous surfaces, or coma, supervening, and terminating existence. Palliative means, however, should be employed, especially *opiates*, the *solution of potash*, or of the *iodide of potassium*, with extract of *conium* or *hyoscyamus*. The constitutional powers should be supported by mild tonics and gentle nourishment, and irritation of the stomach allayed by opiates and salines given in aromatic vehicles, or by other appropriate remedies.

73. vii. *The other States and Associations of Jaundice* require the same principles and means of cure as have been stated, according to the peculiarities of individual cases. — *a*. This especially obtains in respect of *green or black jaundice*, the most appropriate means for which have been just noticed (§ 46.); and in regard of *the complications and successions of jaundice* (§ 49.), which usually present one or other of the pathological states already considered, particularly under the first, second, and third varieties.

74. *b*. For *cachetic* or *pseudo-jaundice* (§ 45.), the remedies mentioned in the articles CACHEXY, CHLOROSIS, CANCER, FUNGOID DISEASE, &c., may be resorted to, when these or any other malignant malady resembles jaundice, owing to contamination of the circulating fluids, or is associated with it. In such cases of contamination, as well as in the very acute and febrile form of jaundice, denominated *malignant* or *pernicious* (§ 58.), the alkaline carbonates with camphor, solutions of the chlorate of potash, or of chlorinated soda; and the other means advised for the hepatic complications of *Typhoid* and *Putro-adynamic* FEVERS (§ 49.), will be most appropriate.

75. *c*. *Traumatic jaundice* (§ 52.) must be treated according to the symptoms evincing the existence of any of the pathological states and alterations above referred to (§ 26.), and conformably with the principles already stated.

76. *d*. *Infantile jaundice* (§ 53.) requires merely gentle aperients, especially the *hydrargyrum cum cretâ*, with dried *subcarbonate of soda* and *rhubarb*, with an occasional dose of *castor oil*.

77. viii. *Of various Remedies recommended by Authors for Jaundice*.—*A*. *Antiphlogistics* are advised by numerous writers in the treatment of jaundice. STOLL supposed that these means are more necessary in this complaint during winter or spring, than at the other seasons. — *a*. *General bloodletting* is directed by HIPPOCRATES, DE LA MOTTE, and others. ZACUTUS LUSITANUS also recommends it, but with the utmost caution. Dr. BRIGHT very properly limits it to the more acute or inflammatory cases. I have attempted above (§ 66. 67.), to point out the circumstances and varieties, in which it, as well as *local depletion*, should be practised; and have mentioned the situations where this latter may preferably be employed. — *b*. *Emetics* are prescribed by HIPPOCRATES, CÆLIUS AURELIANUS, HORSTIUS, LENTIN, HOFFMANN, BROCKLESBY, STOLL, and CONRADI. When diffused inflammation, or even congestion, of the liver is present, or when gall-stones are passing the ducts, they may be attended by some risk; but when inflammatory symptoms and pain are absent, and when the liver is not apparently enlarged or congested, they may be productive of benefit. — *c*. *Laxatives* and *purgatives* are much safer than emetics, and more generally appropriate. HIPPOCRATES, GALEN, FORESTUS, RULAND, &c., placed great dependence upon them. Much, however, depends upon the selection of them, appropriately to existing pathological states. SCHNEIDER prefers the combination of *senna* with *guaiacum*; OTTO, *aloes* with *soap*; LENTIN and HORN, *rhubarb* with *bitartrate of potash*; and the majority of recent writers in this country, *calomel* or *blue pill*, alone, or with other purgatives. I have found, after one or more doses of these last, that any of the former will be very serviceable, especially the bitartrate of potash in large doses, either with the sub-borate of soda (F. 790.), or with the confection of senna, or with this and guaiacum, according to the pathological states inferred to exist. Other purgatives will, nevertheless, be often equally beneficial; but, in the more inflammatory cases, the more cooling should be selected: and when a torpid state of the liver, or deficiency of vital action in it, is inferred, then the warmer, more stimulating, or stomachic aperients should be prescribed, and be aided by the other means advised for this state. — *d*. The *diet* should also be suited to the treatment; and where depletions and evacuations are required, it ought to be most spare, cooling, and chiefly mucilaginous, or consist of the mildest of the farinaceæ.

78. *B*. *Diaphoretics and sudorifics* are prescribed by CÆLIUS AURELIANUS, RIEDLIN, STOLL, RICHTER, &c.; and *antimonials* are the remedies belonging to this class, which are preferred by modern writers. When conjoined with other remedies, they are of much service; as with nitrate of potash, and the spirits of nitric æther, in the more inflammatory states, and with anodynes and opiates in some other circumstances.—The *warm bath*, the *vapour bath*, *fomentations*, and *warm poultices* may also be noticed under this

head, as being sometimes useful. A diaphoretic, as well as a deobstruent, effect is also produced by a combination of calomel with antimonials and opium, or of calomel, camphor, and opium; and is often of great benefit in the more imflammatory varieties, after general or local depletions.

79. *C. Deobstruents and alteratives* of various kinds are much insisted on by Lentin, Stoll, and most modern writers. Several of these, suitable to the more chronic cases of jaundice, are prescribed in the Appendix (F. 503. *et seq.*).— *a.* The deobstruent effects of *mercury* in this complaint are much confided in by Desault, Thomann, and most recent writers; but there is little agreement between them, as to the preparation which should be preferred, or as to the extent to which it should be pushed. Gibbon and others prefer *calomel,* and give it until it produces salivation. In the more chronic cases especially, I prefer Plummer's *pill* with *soap* and *taraxacum,* occasionally aided by *mercurial liniments,* or *plasters,* applied to the hypochondria. — *b.* Simple or medicated *soaps* are much praised by some authors, and particularly by Boyle, Stoerck, Ranoë and Quarin. They are often very useful, either alone, or with taraxacum, mild mercurials, oxgall, assafœtida, or with ammoniacum, or even with narcotics. The *alkaline subcarbonates,* and *solution of potash,* are also serviceable in similar combinations, and, as well as the soaps, are safe medicines in all states of the disease. — *c. Taraxacum,* in decoction or extract, has been much used in jaundice, since it was praised by Ranoë and Quarin; but it should be given in large doses, or be aided by other medicines, as the alkalies, soap, neutral salts, &c. I have given it with small doses of *colchicum,* and in other combinations. (F. 76, 77. 392.)—*d.* The *Solanum dulcamara* was recommended by Linnæus for jaundice, but it is rarely prescribed, although much used as an alterative in cutaneous eruptions depending upon, or connected with, biliary disorder. It may be advantageously given in decoction with taraxacum and the alkaline subcarbonates, or with the other alteratives already noticed (F. 59.), Plummer's pill being taken at night. — *e.* I am not aware that the preparations of *colchicum* have been recommended for this complaint by writers. I have, however, prescribed it in several cases with marked benefit, chiefly in conjunction with mild mercurials, or with soap, alkalies, &c., or with magnesia or neutral salts, according to circumstances. It should be given in small doses, be continued for a considerable time, and carefully watched. If there be much debility, or if it produce depression, it should be given with camphor, or the more tonic substances recommended for the complaint. It often increases the biliary secretion in the cases depending upon chronic inflammatory action, or enlargement of the liver; and promotes resolution of the former, and diminution of the latter, morbid state. — *f.* I have also given the preparations of *sarsaparilla* with advantage, in conjunction with the liquor potassæ.

80. *f.* The internal use of *nitric acid* was advised by Frank. It is likely to be useful in some of the more chronic states. The *nitro-muriatic acid* was praised by Scott, Annesley, and others. I have found it decidedly beneficial in some cases; but have, contrary to the usual mode, prescribed it internally as well as externally. It may be employed as a warm foot-bath, or as a lotion, applied warm or tepid, over the hypochondria and epigastrium. It is most serviceable in torpid states of the liver, and in the more chronic cases. It should not be employed when inflammatory action is present. — *g.* The *chlorate of potash,* or the *chlorinated soda,* will be sometimes useful in the circumstances or conditions of the disease in which these acids are indicated. The chlorate of potash may be advantageously conjoined with the carbonate of soda, or with other substances. — *h.* The preparations of *iodine* are sometimes also of service, in similar states of jaundice to those just alluded to, especially the *hydriodate* and the *iodides of mercury.* These may be given with *conium* or other narcotics, particularly where there is reason to infer the existence of chronic obstruction, or malignant disease of the liver, or of adjoining parts. — *i.* The *liquor potassæ* is also indicated in such cases, and in similar combinations.

81. *D. Diuretic deobstruents* are sometimes prescribed, but chiefly as adjuncts to aperients. They are noticed by Hippocrates and Riedlin. The *acetate of potash* (F. 841.) is the most useful of this class; but the *bitartrate* is equal to it as a diuretic, and even superior to it as a deobstruent in diseases of the liver, when given in large doses, so as to act upon the bowels, or when combined with the *sub-borate of soda* (F. 790.). Several of the foregoing medicines will be aided in their operation by emollient and mucilaginous diluents, as directed by Gilibert and others.

82. *E. Frictions* of the hypochondria and upper regions of the abdomen with stimulating and *deobstruent liniments* have received much less attention than they deserve. Indeed, they have hardly been noticed. When acute inflammatory action is not present, they will be found of much service. Several of those contained in the *Appendix* (F. 297. 311., &c.) may be prescribed either alone, or with *iodide of potassium,* or the *mercurial liniment.* Subsequently the ammoniacal and *mercurial plaster* may be kept applied to the side.

83. *F. Anodyne antispasmodics and narcotics* are directed by Vogler, Richter, Hufeland, Vogel, Brandis, and Conradi, chiefly on the supposition of jaundice being often a consequence of spasm; and ipecacuanha with opium is generally adopted by them. As this complaint often gradually disappears upon the cessation or removal of the remote cause which occasioned it, much of the benefit, that seems to follow these substances, probably depends upon this circumstance. When the disorder proceeds from the retention of a calculus in the ducts, they are probably useful in relaxing the parts, and thereby facilitating the excretion of it. — *Opiates* in full doses are prescribed by Wendelstatt, Vogler, Thomann, De Chave, &c.; and *belladonna,* by Greding. In the states just named, and when severe pain is present, the advantages derived from them are unquestionable, whether exhibited alone, or with calomel, or with alkaline subcarbonates, or with camphor and emollients.

84. *G.* Of *stimulating antispasmodics,* the *spirit of turpentine* is the most deserving of notice. It is recommended by Holst, Odier, and Durande. I have prescribed it with benefit in several varieties of the complaint, and in various modes, as already stated (§ 70.). — *Assafœtida* is mentioned by Herz: both it and *ammoniacum* are sometimes

of use in cases depending on torpid states of the liver, especially when conjoined with soap, alkalies, and other medicines already noticed. (See Form. 503—510. 891. 894.)—An infusion of the flowers of *arnica* was also prescribed by Plenciz and Stoll.

85. *H. Vegetable tonics and bitters* are directed by Riverius, conjoined with aperients; and are often of great service when thus exhibited, and when aided by the alkaline subcarbonates or neutral aperient salts.—The *absinthium* is recommended by Celsus, De Hayde, and Solenander; and *cinchona*, by Cammerarius, Fahner, and De Haen. This latter is prescribed with antimonials by Cornette; but it should be given with caution, as it is contra-indicated in the more inflammatory states of jaundice. I have had reason to believe it to have been even productive of the complaint, when exhibited freely in periodic fevers, before morbid secretions had been fully evacuated. The milder tonics and simple bitters are preferable to it in most cases, especially when they are prescribed as advised by Riverius, and when given during convalescence.

86. *I.* Of the *other means* advised by authors, there are few requiring particular notice. The watery extract of *Chelidonium*, and the extract of *Chicorium*, were recommended by Riverius, Lange, De Schullern, and others; the *Anagallis* with salines, bitters, and the ammonio-chloride of iron, by Stoll; the *Agrimonia*, by Hill; and the *Gramen caninus* and the *Berberis vulgaris* (F. 225.), by several writers. Inspissated *oxgall*, in as large doses as the stomach could bear, was prescribed by Stoll. *Blisters* on the hepatic region were directed by Bang; and *electricity*, by Hall and Darwin. The *mineral springs of Cheltenham*, of *Bath*, or of the *Beulah Spa*; the artificial mineral waters of *Seidschutz* and *Pullna*, or of *Ems*, *Eger*, and *Pyrmont*; are severally beneficial, when taken appropriately to the pathological states of the complaint. *Travelling* and *change of air* were much praised in jaundice by Celsus and Cælius Aurelianus, and in modern times by Gregory and others. Regular *exercise* on foot and on horseback is always of benefit, unless in cases depending upon inflammatory action.

87. The *Diet* and *Regimen* should be suited to the forms of the disease. — *Asses' milk* is advised by Hippocrates. *Common whey* and *goats' whey* are the best beverages that can be used during the attack. The drinks also prescribed under the head *Potus* in the *Appendix* (F. 588. *et seq.*), will generally be found useful. Upon the whole, the *diet* should be very nearly as advised in the article Concretions — Biliary (§ 18.).

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ICHTHYOSIS. — Syn. Derived from ιχθυς, gen. υος, a fish. *Albaras nigra*, Avicenna. *Impetigo excorticativa ; Lepra Ichthyosis*, Sauvages. *Ichthyosis*, Willan. *Lepidosis Ichthyosis*, Young. *Lepidosis Ichthyosis*, Good. *Ichthyose*, Fr. *Fischschuppenaussatz*, Germ. *Ictiosi*, Ital. *Fish Skin, Fish Skin Disease.*

Classif. — 6. *Class*, Diseases of the Excernent Function ; 3. *Order*, Affecting the External Surface (*Good*). 2. *Order*, Scaly Diseases ; 4. *Genus* (*Willan*). IV. Class, IV. Order (*Author*).

1. Defin. — *Morbid enlargement of the papillæ of the skin, and thickening of the lamellæ of the epidermis, either in parts, or over the general surface, presenting irregular compartments, and resembling in many cases the scales of fish.*

2. *Ichthyosis* is defined by Willan and Bateman, to be a papillary, indurated, and horny condition of the skin, to a greater or less extent. It has been placed by them among squamous diseases, but more recent writers have justly contended that it does not belong to this order. It consists of a morbid enlargement and elongation of the papillæ, and a thickening of the epidermis. Horny peduncles are thus formed, which spread so as to acquire broad irregular tops, and, undergoing partial exfoliation, sometimes resemble the scales of a fish.

3. This affection is *general* or *local*, and *hereditary* or *accidental*. When it is hereditary, it either is congenital, or it does not appear until some months after birth. The local form is most frequently accidental, the more general affection is commonly congenital or hereditary. The states of the complaint have been differently divided, and even described, by writers. The division and description of Dr. A. T. Thomson, are altogether incorrect, inasmuch as he confounds, as M. Rayer has shown, a disease of the cutaneous follicles with this affection, and mixes up a description of both, under the denomination of *Fortuitous Ichthyosis*.

4. I. Description. — i. *Hereditary Ichthyosis* is commonly general, affecting those places chiefly in which the skin is naturally thick and the epidermis rough, and being entirely wanting on the prepuce, eyelids, groins, axillæ, and on the palms of the hands and soles of the feet. When the disease is *congenital*, it is usually but little apparent; but the skin, instead of being soft and smooth, is sallow, dry, and shagreen-like. In the course of the two first months, the cuticle becomes, particularly in places, rough, thick, and of a greyish or sallow hue. It may remain in this state for years, or even during life, without proceeding further; but the alteration may increase until it is very remarkable.—Ichthyosis sometimes does not appear until several months after birth. It is then often developed more rapidly, until the epidermis is divided into small irregular compartments, resembling that covering the legs of fowls, or the scales of serpents, the "*Ichthyose nacrée serpentine*" of Alibert.

5. Hereditary ichthyosis is sometimes limited in extent, and is confined chiefly to the extremities. It is then still more remarkably developed, and assumes the appearance of a thick epidermic layer, or of the bark of certain trees. In these cases, as in the foregoing, the epidermis is composed of a number of small compartments of irregular shapes, which are not imbricated, are from two to three lines in diameter, but are often broad in proportion as they are thin. The morbid surface is generally greyish or sallow; sometimes of a brownish hue; but, in a few cases, it is shining or opalescent. It is so rough, that it feels like shagreen, or like the surface of a file, when the hand is passed over it, — "*Ichthyose nacrée cyprine*" of Alibert. — In these states of the complaint, the epidermis is chiefly altered; and the scales, excepting the largest, which adhere strongly, may be removed without causing much uneasiness. But, however detached, they are soon reproduced.

6. ii. *Papillary Ichthyosis*, or that in which there is chiefly a *remarkable elongation of the papillæ* of the skin, is a very rare variety. The first case of this kind, which was minutely described, was that of a native of Suffolk, who exhibited himself, in 1710, under the name of the *porcupine man*. More recently a family of the name of Lambert, affected with this variety, were described by Geoffroy St. Hillaire, and others. About 1830, I examined a very remarkable case, which was seen by many of the medical men of the metropolis. In all these instances, the complaint was confined to the males of a family. The brothers Lambert could trace it back through five generations, all of which were affected with it. The alteration of the skin appears to have been the same in all the cases, and identical with that which I examined. The *papillæ* were remarkably hypertrophied and elongated, over nearly the whole of the cutaneous surface, excepting the prepuce, axillæ, groins, eyelids, soles of the feet, and palms of the hands. Over the rest of the body, the elongated papillæ presented the form of short spines closely pressed together. They were whitish or greyish when separated, but blackish or brown on their exposed surface: and so hard and elastic, that they produced a noise when the hand was passed quickly over them. These productions have generally exuded a reddish brown serum, when divided close to their bases, and have soon been reproduced. They could not be removed without pain.

7. iii. *Accidental and Local Ichthyosis* is a very distinct form of the disease from the foregoing, and is generally produced by pressure. It sometimes occurs on the lower and anterior parts of the thighs of shoemakers; and in other parts, where pressure is made, in various employments. It thus resembles corns in its mode of production.

8. In *the several forms of ichthyosis*, the morbid

cuticle is generally thrown off in summer, or at other seasons, but it is soon after reproduced. RAYER states that the skin, divested of its squamæ, shows no appearance of inflammation; and that its colour is natural, only the shallow furrows on the surface are more remarkable than usual. The cutaneous perspiration and follicular secretion are suppressed. The complaint is not attended by pruritus, or by any other morbid sensation: the general health is unaffected by it. When it is general, copious perspirations take place from the soles of the feet, palms of the hands, and other parts above stated to be free from it. The pulmonary exhalation and urine are probably increased, in proportion to the diminution of the cutaneous exhalation. RAYER thinks, that persons affected with ichthyosis are liable to be attacked with acute inflammation of the skin, which throws off the morbid cuticle; but the original complaint is soon afterwards reproduced.

9. iv. *The Anatomical Changes* constituting ichthyosis have been described by TILESIUS, BUNIVA, and RAYER. The small compartments, into which the epidermic layer is divided, do not overlap each other like the scales of fish: hence the term ichthyosis is inappropriate. These layers, according to BUNIVA, consist chiefly of gelatine, hardened by phosphate and carbonate of lime. M. DELVAUX states, that they contain also traces of iron and of silica. They present the same chemical constituents as the hair, nails, &c. The lines or furrows of the surface of the corion are more distinct, and the papillary eminences more decided, in this complaint, than in the natural state. TILESIUS found the cutaneous follicles obstructed, and full of a thick substance, in *the papillary variety* (§ 6.); and in the *squamous varieties* examined by RAYER, these follicles were but little apparent, or imperceptible. Dr. MARTIN observed the hair and hair-bulbs remarkably enlarged; and the corion is usually thicker, harder, and denser than natural. Ichthyosis appears to be unconnected with any internal disease.

10. II. DIAGNOSIS.—This affection is improperly classed by WILLAN and BATEMAN with squamous diseases, for it is entirely independent of inflammatory action. True ichthyosis always commences in a few months after birth, if it have not already existed; for the local variety can hardly be considered as connected with it, otherwise than in external appearance, and in the absence of inflammation. — In *lepra*, *psoriasis*, and *pityriasis*, the formation of scales is constantly preceded by redness of the skin: *lichen* is attended by severe pruritus, and preceded by the eruption of papulæ; and the scaly condition of *chronic eczema* is quite distinct from local ichthyosis. Ichthyosis, on the contrary, is attended neither by heat nor by pruritus, and is perfectly free from every inflammatory symptom. The *horny* or *warty productions* on the skin, — the former of which has been classed by WILLAN and BATEMAN with this complaint, — are entirely different from it, not only as to the form of the morbid formation, but also as to the extent of surface affected; these productions being limited to one or more points of the cutaneous surface.

11. The *ichthyosis of the face*, noticed by Dr. BATEMAN and Dr. A. T. THOMSON, has been more correctly described by M. RAYER, who has shown it to consist of a *sebaceous deposit* from diseased follicles. I have met with one instance of this affection, extending over, and on both sides of, the nose. It is always associated with inflammatory action, in its developed state. The following is the description of it by RAYER: — "The part of the integument affected, becomes, at first, unctuous or oily: the secretion of the sebaceous follicles then increases; the fluid thrown out upon the surface acquires additional consistency, and finally forms a kind of *squamous crust or layer*, of greater or smaller extent. Soft at first, and adhering but slightly, it by and by acquires hardness, and then cannot be removed without very considerable pain. The skin under this sebaceous deposit is of a vivid red; the orifices of the follicles appear dilated, and sometimes distended with concrete sebaceous matter."

12. III. CAUSES.—M. RAYER considers general ichthyosis to be a not infrequent disease. He has seen upwards of forty cases of it. It is known to be transmitted through several generations, and only to the male offspring. The whole of the male children of the same father and mother, who were themselves free from it, have been affected with ichthyosis. This was the case with two brothers, one of whom was in the Hospital "*De là Charité*," in 1827. This disease is very seldom produced accidentally long after birth. Neither climate, nor temperature, nor mode of life, exercises any influence in causing it. Some have ascribed it to moral affections of the mother during pregnancy; but this is extremely problematical. That it may be congenital, without the parents having been affected by it, is shown by a fact stated by RAYER: — He was consulted respecting three little boys who had it congenitally. Both parents were quite healthy and well formed, and the mother had never experienced disquietude nor alarm during these three pregnancies. It is very rarely observed in females.

13. IV. PROGNOSIS.—Hereditary, or congenital ichthyosis, frequently disappears for a time in consequence of acute inflammation of the skin; but a person affected with it can hardly be considered as likely to be permanently cured of it. Accidental and local ichthyosis, however, often yields to treatment.

14. V. TREATMENT.—i. *Hereditary ichthyosis* of considerable extent has rarely been permanently cured. M. RAYER states, that he has not succeeded in a single case. Happily this alteration of the skin is unattended by internal disorder, and is thus, comparatively, of little consequence. Emollient applications long continued, gentle frictions, mucilaginous and soothing fomentations, tepid baths frequently repeated, or alternated with the watery vapour, or the alkaline warm bath, have been severally employed in clearing the skin from the scales covering it, or in preparing it for the application of other remedies. WILLAN and BATEMAN prescribed without benefit various plasters, stimulating lotions, and other topical applications. Mr. COULSON resorted to a wash containing corrosive sublimate, in a boy, who was under his care; and subsequently, a liniment consisting of half an ounce of the ointment of nitrate of mercury and an ounce of olive oil, which was applied twice in the day. The scales soon disappeared, but the brown colour of the skin still continued. WILLAN recommends tar and pitch for this complaint; and gave as much as half an ounce, or even an ounce, daily, for some months:

and Bateman adopted the same treatment, with advantage both to the local affection and to the general health. Dr. Elliotson, for one of two brothers affected with ichthyosis, prescribed a warm bath every day, and desired the patient to anoint himself, on coming out of it, with oil; gentle friction of the surface, with sweet oil being employed twice a day besides. *Pitch* was also given internally, and increased gradually until ten scruples were taken three times in the day. The patient was clothed in flannel; was advised never to wipe the surface of his body after having anointed himself; and was directed to wear the same flannel shirt, drawers, and stockings, so that his skin was kept impregnated with oil. In about six or seven weeks the disease disappeared, the skin being soft and supple. The pitch produced no effect on the organs of digestion; and it neither was mixed with, nor had altered the smell of, the evacuations. Dr. Elliotson refers to two instances of the disease having been cured by Dr. Willan, by the use of pitch taken to the extent of an ounce daily. In Dr. Elliotson's case, no benefit was derived from the warm bath, as it produced smarting of the surface after the removal of the thickened cuticle; but the use of the oil probably accelerated the cure. The arsenical solution has also been tried, but with either very little or no benefit.

15. ii. For *local or accidental ichthyosis*, flying blisters, or topical stimulants, have been directed. Gentle frictions with a flannel cloth after coming out of a simple or sulphureous tepid water bath, and the sulphureous fumigating baths, aided by active exercise, have been found most serviceable in this form of the complaint. Mr. Plumbe succeeded in two cases, in removing this alteration of the skin, which was limited to the legs, by strapping the parts tightly with adhesive plaster, and applying a roller kept constantly moist with cold water. The straps were removed every fourth or fifth day. On the whole, this affection has been found to be very little under the control of medicine; and, notwithstanding the most active treatment has been adopted, the disorder has been known to continue for several years, with occasional variations.

16. iii. The *affection of the sebaceous follicles* of the face, mistaken by Dr. A. T. Thomson for ichthyosis, was successfully treated, by the decoction of the dock root, or the *Rumex obtusifolius*. It is prepared from one ounce of the sliced recent root, boiled in two pints of water down to one pint. The dose is a wine glass full three times in the day. It may be taken alone, or with the arsenical solution; if it should purge too briskly, a few drops of the tincture of opium may be added to each dose.

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ILEUS. — *See Colic.*

IMPETIGINOUS AFFECTIONS. — Syn. *Impetigo* (from *impeto*, I attack or infest), Celsus, Pliny. Λειχην αλφος, Galen. *Lepra Squamosa*, Auct. var.; *Herpes*, *Phlyctæna*, *Lichen*, &c., Auct. *Phlysis Impetigo*, Young. *Ecpyesis Impetigo*, Good. *Dartre*, *Dartre crouteuse*, Fr. *Zittermal*, *Ringwarm*, Germ. *Impetigine*, Ital. *Tetter*, *Humid or Running Tetter.*

Classif. — 3. *Class*; 3. *Order* (*Cullen*). 6. *Class*; 3. *Order* (*Good*). 5. *Order*, Pustular Eruptions (*Willan*). III. Class, I. Order (*Author*).

1. Defin. — *An eruption of one or more crops of small, yellow, itching pustules, disseminated or collected in clusters, the contents of which dry up in a short time, and assume the form of yellowish, rough, or prominent incrustations; generally unaccompanied by fever, and not contagious.*

2. I. Description. — Impetigo may attack every part of the body. It may be simple or complicated. Willan, Bateman, and Biett enumerate five species of the disease. I agree, however, with Dr. A. T. Thomson, in limiting them to two; three of those proposed by Willan being merely varieties of simple impetigo. The first species, or simple impetigo, according to this view, is unattended with fever, and comprises the figured, scattered, and scabid varieties. The second, or complicated, or erysepelatous species is attended with fever, owing, probably, to the extension of the inflammatory action to the more deeply seated integumental tissues.

3. i. *Simple Impetigo* — *Impetigo simplex* — usually occurs without any premonitory symptoms or derangement of health. It is met with most frequently in children at the period of dentition, in young persons of either sex, and in those of a sanguineous and lymphatic temperament, with a fine susceptible skin and florid complexion. It most commonly appears in the spring, at which season several have been periodically attacked by it during many successive years. This species occurs principally under two varieties. The pustules may be collected in circular or oval groups, occupying a surface of greater or less extent, but pretty exactly circumscribed: this variety constitutes the *Impetigo figurata* of Willan. Or the pustules may be scattered far apart, assuming no particular form, but disseminated over a surface of variable extent: this variety has been called *Impetigo sparsa*. To these a third division has been added, by the name of *Impetigo scabida*, but this is merely a more severe form of *impetigo sparsa*. Many intermediate degrees exist between these varieties; but the characters they present are

sufficiently distinct to give scope to the general study of the disease. At the same time each variety may be acute or chronic, according as it consists of a single crop, or of successive eruptions, of pustules.

4. *A. Impetigo figurata — Dartre crustacée flavescente* of M. ALIBERT — is the most common of these affections. It may occur in any part of the body, — on the neck, trunk, and extremities, particularly the hands; but it generally occupies the face, appearing most frequently on the middle of the cheeks, from whence it extends, in a circular or oval direction, over a considerable extent of surface. Sometimes it is confined to the eyelids, when it is commonly complicated with ophthalmia; and occasionally it appears on the chin, the ala nasi, and immediately below the margin of the septum of the nose. Although this variety usually occurs without very manifest disease of the general system, yet it not unfrequently follows anxiety or other depressing affections of the mind. In this case it is ushered in by a feeling of lassitude, by disorder of the digestive functions, by weakness and uneasiness, accompanied by pain in the epigastric region, and sometimes by cephalalgia. The eruption, as it first appears on the face, commences by one or more small, red, and very superficial blotches, which itch considerably, and gradually enlarge, becoming covered with small, yellowish, psydracious pustules, placed so close to each other as to be almost confluent, and surrounded by a red inflamed border. The pustules are but slightly elevated, and are the seat and source of much heat and stinging pain. These clusters, which are usually of a circular or oval form, and of various dimensions, may continue isolated, or extend still further by the development of fresh pustules at their circumference; and the eruption may be so extensive, that both cheeks, and even the whole chin, may be covered with it at once. The pustules, however, do not remain long in this state; but in the course of thirty-six or forty-eight hours, or at most three days, they burst, and discharge an ichorous fluid, which dries quickly and is converted into a yellowish crust of greater or less thickness, very friable, slightly furrowed, semitransparent, and resembling portions of candied honey, or the concrete gummy exudations on a cherry-tree. At the same time the discharge continues under these crusts, thereby increasing their thickness, and causing them to extend considerably beyond the limits of the original pustules; and it is usually at this stage of the disease that the patient is seen by the practitioner. The skin in the circumference of these incrustations is of a red colour; and if the scabs fall or are rubbed off, the integuments under them appear likewise red and excoriated, exhibiting at the same time minute pores, from which a purulent discharge exudes, which greatly augments the heat and smarting. Towards the edges of these diseased patches may be still seen some unbroken psydracious pustules, and others over which the liquid has flowed when it is scarcely coagulated. If the disease be of great extent, the features can hardly be recognised.

5. *Impetigo figurata* continues in its crustaceous state from two to four weeks, when it is not protracted by successive eruptions: the itching and heat then abate, as well as the morbid secretion; the incrustations become drier, and fall off irregularly, leaving one or more red spots or marks, which remain visible for more than a month. The cuticle at the same time is so thin, as to be liable to excoriation from the slightest friction, and a very trifling exciting cause often brings back the disease. More frequently, however, the ichorous discharge is reproduced, accompanied with fresh crops of psydracious pustules; the eruption is repeatedly renewed after running its usual course, and thus continues for many months, sometimes for years. In this manner it becomes a chronic disease, although the successive inflammations keep it always in an active state. In these cases the inflammation does not spread superficially, but penetrates the whole thickness of the skin, and sometimes affects the subcutaneous cellular tissue. When the disease yields either spontaneously, or to medical treatment, the amendment commences in the centre of the patches; and even when this occurs, not infrequently the edges retain their diseased character, and fresh pustules are produced: these, however, as the treatment proves successful, also gradually disappear; and the skin regains its natural colour slowly in these parts.

6. *Impetigo figurata* may appear on the limbs; and even on the body. When it affects the lower extremities, the patches are usually large, and of an irregular oval, whereas they are smaller and rounder on the upper limbs. Sometimes the patches enlarge by successive marginal crops: this has been observed on the legs, which have thus been gradually covered from above the knee to the ankle. The disease often becomes chronic, and the time of its duration varies. In such cases, we do not observe successive and abundant crops of pustules, or these large inflamed patches, but merely a few occasionally. Frequently, however, no pustules are found; but the peculiar form of the patches and crusts, with the partial eruption from time to time, suffice to characterise it. In some instances the pustules are intermixed with transparent vesicles, as in some of the varieties of *herpes*. When this intermixture occurs, the disease is much more troublesome from the extreme irritation, itching, smarting, and heat, which accompany it, and is much more difficult of cure. When these vesicles break, they discharge a fluid much more acrimonious than that of the pustules, which, wherever it touches the sound skin, produces a vesicular inflammation and a pustular eruption. This variety of the affection appears principally on the hand, about the metacarpal bones, or on the wrist. The vesicles appear in slow succession at a little distance from each other and from the pustules; when broken, they are little disposed to heal; and the cuticle ultimately becomes thickened and inflamed, and covered with the rising eruptions, small humid ulcers, and chaps or fissures. The sensation of burning and intense itching is extremely distressing, especially on the first rising of the vesicles; and every remedial application, which is employed, becomes a source of irritation, and increases the evil.

7. *B. Impetigo sparsa* differs from the preceding variety merely in the irregular and scattered distribution of the eruption. Its nature and progress are the same; but, instead of being arranged in circumscribed groups, its pustules are dispersed without any regular order over the extremities,

neck, face, shoulders, and external ears. This variety is most prevalent in autumn, continuing obstinately throughout the winter, and disappearing only at the approach of summer. It has a greater tendency to pass into the chronic state than the last variety. Although it may develop itself on any part of the body, yet it affects more particularly the extremities, manifesting an especial predilection for the legs, and in that situation becoming extremely troublesome and obstinate. Sometimes it confines itself to one spot alone; at others, it covers a whole limb, or even more than one at the same time.

8. The pustules in *impetigo sparsa* are developed in the same manner as in *impetigo figurata ;* but here, instead of being collected together, they are scattered irregularly over the diseased surface, and accompanied with insupportable itching. The incrustations also, which follow the bursting of the pustules, are thicker and more friable, and not formed into so large plates as in *impetigo figurata :* the attendant inflammation is, however, more extensive ; and as they fall off and disappear, the surface of the limb becomes studded with ulcerations and fissures. Œdema is not an infrequent attendant or consequence of this variety of the disease.

9. In some cases, and especially in persons of advanced age, with enfeebled constitutions, the crusts attain a great thickness: they are of a yellowish brown colour, variously divided by deep fissures. They have been compared to the bark of a tree by Willan, who calls this variety *Impetigo scabida.* It is, however, nothing more than a severer form of the last variety. Sometimes these crusts cover a whole limb, till it is cased with them, the motion of it becoming both difficult and painful; at the same time considerable heat and a tormenting itching exist. After a while, these crusts split; and, when a portion of them is detached, a copious discharge exudes from the excoriated surface, quickly concretes, and fills up the vacuity. When this variety affects the lower extremities, and is very severe, it sometimes occasions œdematous infiltration and ulceration, and even extends to the toes and secreting matrices of the nails — *Onychia Impetiginodes.* The œdema and ulceration commonly appear about the ankles, particularly in aged, weakly, or broken-down constitutions. The ulcers are uneven ; and either discharge a sero-purulent fluid, or are covered by yellowish crusts ; their edges being irregular, purplish, or livid, and often crowned with small sanguineolent pustules. When this variety occurs in the upper extremities, it does not differ from that already described, but it is much less severe, and its chronic form more rarely associated with œdema and ulceration, than that observed in the lower extremities. Acute *impetigo sparsa* of the face usually presents greenish yellow incrustations, dispersed over the cheeks or adhering to the beard in the adult. In children, the inflammation often extends to the nose, which swells, and is sometimes plugged up ; the disease then frequently becoming chronic.

10. *C. Impetigo Favosa.*—This variety is merely impetigo sparsa affecting the *neck, ears,* and *hairy scalp* — the *Porrigo favosa* of Willan, and *Tinea granulata* of Alibert — especially of children, and occasionally of adults. It occurs most frequently in the back parts of the head, but the entire scalp may be implicated; and it appears as yellowish white pustules, irregularly scattered over the hairy scalp, and attended by inflammation and pruritus, their centres being traversed by hairs. In from two to four days, the pustules pour out a fluid, which agglutinates the hair, and dries into small brownish or greyish, rough, and irregular crusts or masses like candied sugar. These become friable and detached from the surface, but adhere to the hair, which often seems filled with them ; a faint, sickly, or unpleasant smell being exhaled from the head, when cleanliness is neglected. *Pediculi* multiply rapidly, and swarm in the hair, which is not lost, but is often agglutinated or matted by the discharge.—Impetigo of the hairy scalp is not contagious, and does not implicate the piliferous bulbs, like *favus* or true *porrigo.* It seldom lasts longer than some months ; and it commonly is removed in the course of a few weeks, with proper treatment. When it becomes chronic, the inflammation often extends to the cellular tissue underneath, giving rise to small circumscribed abscesses. The lymphatic glands of the neck are frequently enlarged and painful.—Rayer and Green consider that this affection of the scalp is strictly a form of *Impetigo sparsa,* and not a variety of the disease, to which Willan has applied the term *Porrigo;* and I am of the same opinion.

11. ii. *Complicated Impetigo.* — *A. Impetigo Eczematosa.* — Impetigo is sometimes associated with *Eczema—Eczema Impetiginodes.* (See art. Eczema, § 5.) The eruption so frequent in infants during suckling and teething, commonly called *Crusta Lactea,* or *Milk Scall,* is evidently an association of this kind, chiefly affecting the face, and extending partially to the scalp ; the characters of eczema predominating in some infants, and those of impetigo in others. Occasionally it assumes nearly the appearance of impetigo figurata. It has been variously arranged by writers on diseases of the skin, who have, even to the present day, been more desirous to point out, and even to feign, distinctions, than to trace the changes which these diseases undergo, and the connections which subsist between them, or to show how frequently the one runs into the other ; and has been termed *Impetigo larvalis, Impetigo mucosa, Tinea lactea* (Sauvages), *Tinea benigna, Tinea muciflua* (Alibert), *Porrigo lactea, Porrigo larvalis* (Willan, Bateman), *Lactumen, Eczema lactea,* &c., according as it was supposed to be allied to *Impetigo, Porrigo,* or *Eczema.* This of itself is sufficient to show the very intimate relation of these affections to each other, and to point out the necessity of considering them in their natural conditions, and in connection with their particular seats, and with the states of vital action ; and not merely with reference to certain artificial distinctions, which often cannot be ascertained, and which sometimes do not exist. The differences between *vesicles* and *pustules,* so much insisted on in the classifications usually adopted at the present time, often do not exist, or exist not in such a manner as to become available to the practitioner. These, and numerous others, so implicitly received as matters of belief, may be useful, as a part of the craft of the adept; but they are of very minor importance in the estimation of the truly philosophic observer, and are valued by him for just as much as they may be worth, in the particular cases in which

they are manifest. An eruption may be vesicular to-day, and pustular to-morrow; or, in other words, the former, owing to changes in the vital actions of the part affected, and in the morbid secretion, may pass into the latter; or both kinds of eruption may be coexistent or coëtaneous, either in the same, or in different, situations of the same case. Instances will also occur, in which the most acute observers will be puzzled to determine whether the primary eruption is vesicular or pustular; for it may be intermediate as respects the appearances both of the contained fluid, and of the containing and surrounding tissues. To whatever genus this eruption may be referred, — whether it be dignified in being described as a genus of itself, or be viewed as merely a species, or be debased to the rank merely of a mongrel variety, — it is consolatory to know, that, in its intenser states and more extended forms, as well as in slighter grades, and however great the attendant pruritus and pain may be, or however deep the chaps or fissures may seem, no permanent marks or cicatrices are produced by them.

12. *B. Impetigo Erysipelatodes* is easily distinguished, by presenting, at its commencement, the ordinary symptoms of erysipelas. The other varieties of the eruption are in general unattended by any febrile disturbance, although the digestive organs may be more or less disordered. But this is ushered in by decided symptoms of constitutional commotion. Its premonitory stage is characterised by perturbation of the system, fever, much burning and smarting heat, an œdematous state of the eyelids, and a redness and puffy swelling on the upper part of the face. This state of things continues for two or three days; when, on running the finger over it, the surface, instead of the smoothness of erysipelas, is found to exhibit a slight inequality; and on minute examination it seems papular. In a day or two more it is covered with numerous psydracious pustules, which first appear below the eyes, but soon cover the greater part of the face, and sometimes extend to the neck and breast. The itching, smarting, and sense of heat, which accompany these pustules, are very distressing. When they break, a hot acrid fluid exudes, which irritates, and often excoriates, the sound surface on which it flows. The face remains in this painful condition for ten or fourteen days, when the discharge diminishes, and concretes into thin yellowish scabs, in the interstices between which, fresh pustules arise at intervals with renewed heat and pain, and run the same course as the former. The disease may continue thus severe and troublesome for two or three months. The period of its duration, however, is uncertain; and when it disappears, it leaves the cuticle in the same dry, red, and brittle state, which characterises the departure of the other varieties of impetigo. During the progress of this disease, the health of the patient is not very much disordered, and the constitutional disturbance is much less than in erysipelas. This form of the disease is occasionally confounded with *eczema impetiginodes*. In the advanced stage, however, the distinction is easily recognised.

13. Besides the above varieties of *impetigo*, Willan and Bateman mention another, under the title of *Impetigo rodens*. It is, however, of very rare occurrence, and cannot with propriety be called an impetiginous disease, being more of a malignant ulcer, complicated with psydracia. It is said to be uniformly fatal, and to have been benefited by no remedies, either external or internal, which have been employed for its relief.

14. II. Diagnosis. — The varieties of impetigo are liable to be confounded with other pustular eruptions, especially *porrigo*, *ecthyma*, and *scabies*, and with *eczema;* but a careful inspection of the pustules and of the incrustations, as either may present themselves, will show the differences between them. — *a*. The clusters of *impetigo* are distinguished from the circles of *porrigo*, in not continuing to pour forth a purulent and glutinous discharge, but, after the first eruption, an ichorous humour; and in not forming those thick soft and copious scabs, which characterise the latter disease. The pustules of impetigo discharge, while those of porrigo, seated more deeply, are quickly changed into dry, yellowish-coloured, cup-shaped scabs. The crusts of the former are brown, or of a dull grey, and not broad, thick, nor continuous, as in *porrigo scutulata*. Impetigo of the hairy scalp is not likely to be mistaken for *porrigo lupinosa:* it does not implicate the piliferous bulbs, like this and the other varieties of porrigo. It is distinguished, however, with greater difficulty from *eczema impetiginodes* affecting this part, the principal difference being in the appearance of the incrustations; but, as already insisted on, these latter are very nearly related eruptions. — *b*. The diagnosis between *impetigo* and *scabies* depends on the distribution of the eruption in patches; the copious exudation of ichor; and the reddened, rough, and fissured cuticle; and the heat and smarting, which accompany the itching, in the former. In the strictly purulent scabies, the pustules rise to a much greater elevation and magnitude, than in this complaint, and are filled with a thick, yellow pus, and are more inflamed around their base. Porrigo and scabies are contagious; but none of the varieties of impetigo possesses this property. — *c*. In its more advanced stage, impetigo may be mistaken for *psoriasis* or *lepra;* but, in these, there are no laminated concretions of ichorous matter or lymph, the squamæ consisting of exfoliations of morbid cuticle. These scaly diseases emit no fluid; and the existence of pustules and of a discharge, however slight, are sufficient to determine the impetiginous eruption. — *d*. The pustules of *psycosis* are larger, and not so yellow, and are more isolated and more prominent, than those of impetigo; which are always much crowded, and secrete abundantly. The scabs of the former are drier and of a deeper colour than the crusts of the latter; and are reproduced only after a fresh eruption of pustules. The crusts in impetigo are greenish yellow, thick, semitransparent and reproduced without any renewal of the pustules. In psycosis, also, the pustules do not break till the fifth, sixth, or seventh day; whilst in impetigo they burst on the third or fourth. Moreover, tubercles and indurations are observed in the former, but not in the latter. — *e*. Impetigo is more likely to be confounded with *syphilitic eruptions* on the face; but the peculiar character of venereal desquamations, or the firmly adherent scabs, concealing ulcers and leaving indelible cicatrices, sufficiently distinguish the latter from the former. Some of the forms of eczema may be mistaken for impetigo, but the diagnosis has been fully stated in the article Eczema (§ 13.). The

most superficial observation will detect the very marked difference between *acne rosacea* and this complaint. Mr. Dendy states that the internal use of the deuto-ioduret of mercury often produces vesicles, followed by yellow or yellowish green scaly crusts, which may be easily mistaken for those of impetigo and porrigo.

15. III. Prognosis.—This is more favourable in impetigo than in *lichen*, *lepra*, *psoriasis*, *eczema*, and many other cutaneous eruptions. In whatever part of the body the disease, in its *acute state*, be situated, it generally yields to medicine in two or three weeks. Its duration in the *chronic form* cannot be stated with precision; as this necessarily depends on the constitution of the individual, the number of the eruptions, and the existence of other particular conditions, such as scrofula, pregnancy, amenorrhœa, the change of life, &c. When chronic impetigo occurs on the head, on the upper lip, or any other region covered with hair, it often proves a very obstinate and troublesome disorder; especially if the patient be of advanced age, of a scrofulous diathesis, or a shattered constitution. But, under no circumstances, can it be regarded as attended by danger. The sudden suppression of the more severe forms of the eruption, particularly those affecting the face and scalp of children, may, however, be productive of most serious disease.

16. IV. Causes. — Impetigo is not communicated by infection. It is most frequently observed among the poor, ill-lodged, badly fed, and filthily disposed classes. Its exciting causes are, however, sometimes obscure. Individuals of a sanguineous or sanguineo-melancholic or lymphatic temperament, and scrofulous constitution, with a thin, soft skin, are most liable to it. In them it is occasionally excited by violent exercise, by intemperance of any kind, or by the depressing passions of the mind, as grief, disappointment, fear, &c. It is very often preceded by headach, languor, and disorder of the alimentary canal, and cannot be traced to any other exciting cause than this disorder. — Infants at the breast, and children during teething, particularly the lymphatic and scrofulous, are most liable to the varieties affecting the face and scalp. Young persons with fine skins are sometimes attacked with that of the face, on exposure to a hot sun. Females, on the apppearance, and on the cessation, of the catamenia, are also apt to be affected with this complaint. Several external causes may, however, excite pustules of impetigo, by acting directly on the skin. Persons who handle irritating substances, as raw sugar, lime, or metallic dust, often have impetiginous eruptions on the hands. Bateman regards the pustules, caused by the ointment of tartarised antimony, as a species of this disease; but they are of an entirely different character, and cannot be classed among any of its varieties. I believe, that disorder of the digestive organs, and accumulations of mucous sordes and other secretions in the *primæ viæ*, more commonly occasion impetigo than is generally supposed. I scarcely have seen a case, in which this derangement was not manifest either before, or in the course of, treatment; and in which this eruption was not evidently symptomatic of it. In this opinion I am supported by Mr. Dendy, my late colleague at the Infirmary for Children, where cases of this kind came frequently before us.

17. V. Treatment. — i. Whatever be the variety of simple impetigo, one mode of treatment is indicated. In the commencement of the disease, Willan and Bateman recommend the internal administration of *sulphur*, but not in sufficient quantity to produce purging; and if there is much inflammatory irritation of the cuticle, *soda*, *nitre*, or the *bitartrate* of *potash*, with which some of the *vegetable acids*, as *citric acid*, or *lime juice*, may be advantageously combined. The indiscriminate employment of sulphur has, however, sometimes aggravated the symptoms, and favoured the re-appearance of the eruption. I have prescribed, with marked benefit, the *sub-borate of soda* in emollient vehicles, either with or without small doses of nitre, or of the bitartrate of potash. — *Bloodlettings*, either general or local, have been proposed in extensive attacks of *impetigo figurata*, and in plethoric individuals may be of advantage; but, in general, they are not productive of benefit, and in persons of a weak and scrofulous habit of body are detrimental. If the eruption is attended by much fever, *calomel* and *antimonials*, or other mild mercurials, cooling *saline solutions*, and *diaphoretics* with *diuretics*, will be of service.

18. Locally, emollient fomentations, such as the decoction of mallows, digitalis, poppy heads, &c., and ablution with tepid water, are of the most essential service in the incipient stage of this disease, especially of the common saline mixture, with conium, be given at the same time. At a later period, saturnine or alkaline lotions, and the application of the ointment of the *acetate of lead* or *oxide of zinc*, will accelerate the cure, and will be often sufficient to effect it.

19. ii. When this affection occurs in children at the period of dentition, simple cleanliness is frequently all that is required. Here the eruption is occasionally accompanied by a manifest improvement in the constitution, and it would be highly imprudent, and even injurious, to check or repel it. If it occurs on the hairy scalp or face (§ 10.), the hair must be removed, and emollient applications resorted to. Where there is much local inflammation, or in plethoric children, *leeches* ought to be applied behind the ears. *Saline purgatives*, as the sulphate of soda, sulphate of magnesia, or tartrate of potash and soda, may be given with advantage in these cases, in doses of from two drachms to half an ounce daily.— If the disease, wherever occurring, proves obstinate, it has been usually treated by an alterative mercurial course, particularly *Plummer's pill*, or the *hydrargyrum cum cretâ*, with the decoction of *sarsaparilla* or *cinchona*; but a more beneficial effect has been derived from the exhibition of fine or six grains of *calomel* at bedtime, followed by a brisk *cathartic* the next morning, and a moderate dose of the *liquor arsenicalis*, taken three times a day, in the decoction of *elm bark*.

20. iii. As to *local means*, almost every variety has been tried in this disease. In some instances the patient cannot bear the most soothing and emollient applications; while, in others, the most stimulant have been employed with advantage. Where the irritation is insupportable, the use of the *hydrocyanic acid* has been suggested by Dr. A. T. Thomson, in the proportion of one fluid-drachm to four fluid-ounces of water, combined with one drachm of *alcohol*, and six or eight grains of *acetate of lead*; and subsequent expe-

rience has shown the value of this application. It sooths the irritation, and disposes the skin to regain its healthy action: but it must not be applied without caution; as cases have been recorded, where it became absorbed into the system, and produced depressing effects on the constitution, with considerable intermission of the pulse. These unpleasant symptoms, however, ceased on discontinuing it. It is useless to apply any local remedies, until the thick incrustations, which occur in *impetigo scabida*, are removed by emollient poultices, or by a weak decoction of poppies, or by exposing the surfaces to the vapour of hot water, &c. Any of the mild ointments before mentioned may afterwards be applied, and the surface should be covered with pledgets of soft lint, or the whole should be touched with a solution of *nitrate of silver*; or, if the skin is not very irritable, and the attendant inflammation but slight, while at the same time the disease has become chronic, the baths of Harrowgate, or artifical *fumigations of sulphur*, the hot air and *vapour baths*, and the *alkaline* and *sulphureo-gelatinous baths* will frequently both procure the removal, and prevent the recurrence, of the eruption. But in the more inflammatory cases, and in plethoric persons, bloodletting should precede a course of these baths. With the same intention, the baths of Barèges, Loüesche, Cauterets, Enghien, and many other Continental springs, have been recommended. Great benefit has also been derived from the warm sea-water bath, especially when followed by a course of sea bathing; it should, however, be remembered that salt water is injurious during any actual inflammation. But great discrimination is always required in the treatment of this eruption. Where there are much inflammation and irritability of surface, the internal remedies should be of a cooling and sedative nature; and the external applications, emollient and palliative; — in an opposite state, the *arsenical solution* may be given; and slightly stimulant ointments, such as the ointment of nitrate of mercury diluted with six or seven parts of simple ointment, or an ointment of trisnitrate of bismuth, may be applied. — In all cases, the *diet* of the patient should be restricted, and animal food taken in very moderate quantity: milk and farinaceous food are the most appropriate. Fermented liquors, spirits, and wine, ought to be strictly forbidden.

21. iv. In *impetigo erysipelatodes*, antiphlogistic means must be early adopted. *Purgative medicines*, especially the infusion of senna with full doses of the alkaline carbonates, and the *neutral salts* with *antimonials* and *nitre*, will materially alleviate the fever; but when the discharge is copious, and incrustations begin to be formed, the greatest benefit will be derived from the *decoction of cinchona* with *hydrochloric*, or dilute *sulphuric acid*.— If the disease becomes chronic, a slight alterative course of *mercury* and of *sarsaparilla* generally proves beneficial. The *solution of potash* and the *alkaline carbonates* are also serviceable, when taken in tonic infusions. The *local remedies*, which were recommended in the other forms of the disease, namely, emollient fomentations and tepid ablutions, mild ointments applied to the excoriated surfaces, and sea bathing, or sulphureous fumigation on the decline of the eruption, will also be required in this variety.

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IMPOTENCE AND STERILITY. — Syn. *Impotentia Generandi*, *Sterilitas*; 'Αναφροδισια, *Anaphrodisia* (from α, neg., and ἀφροδισια, and that from 'Αφροδιτη, Venus), Auct. var. *Impuissance*, Fr. *Unvermögen zum Beyschlaf*, *Ohnmächtigheit*, Germ. *Impotenza*, Ital.

Classif. — 4. *Class*; 1. *Order* (*Cullen*). 5. *Class*; 2. *Order* (*Good*). I. Class, II. Order (*Author*).

1. Defin. — *Incapacity of sexual intercourse, and inability of procreation.*

2. *Impotence* and *Sterility* are so intimately related, that they must necessarily be considered under one head, although disjoined by Good and some other nosologists. They are subjects of much greater practical importance than has been conceived by many, and often involve the happiness and perpetuation of families. Yet have they, by a sort of professional prudery, been either entirely overlooked by medical writers, or very imperfectly discussed, and thereby relinquished to the irregular practitioner, or to the entirely unqualified empiric. In the present æra of high refinement, and of luxurious, if not vicious, enjoyments; and under the influence of noxious plans and systems of education; instances are very numerous, for which medical advice is required for the removal of the morbidly disqualifying conditions about to be considered, but is not resorted to so frequently as it ought to be. Since advice is thus often necessary, the ability of those, from whom the community have a right to expect it of the most judicious kind, should be equally great in providing it. There is every reason, also, to believe, that it would be oftener sought after, if the subject were known to be more fully entertained by the duly qualified members of the profession. The practical consideration only of these morbid conditions falls within my plan: their legal relations are very ably discussed in the classical works of Paris, Beck, and Smith.

3. *Impotence* may exist in either sex, but most commonly in the male, owing to the sexual conformation. *Sterility* most frequently depends upon the female, although it sometimes is owing to the male; and, in a practical point of view, if not in a medico-legal one, it is more frequently thus owing, than is stated in books.

4. *Impotence* and *Sterility*, in respect of both sexes, have been differently arranged by writers; — into *absolute* and *relative*; *constitutional* and *local*; *direct* and *indirect*; *permanent* and *temporary*; and, by Dr. Beck, into *absolute*, *curable*, and *accidental*. These distinctions are all of importance in the consideration of the subject; but the divisions founded on the nature of the causes are more useful. — M. Raige Delorme has ar-

ranged impotence into — 1. that depending upon lesions of the sexual organs; — 2. that proceeding from disorder or interruption of seminal emission; — and, 3. that caused by defect of the faculty of erection. The division adopted by Dr. Beatty, into — 1. Organic; — 2. Functional; — and, 3. Moral; — although not materially different from the foregoing, is preferable to it. — I shall consider the subject with reference — *first*, to the male, and, *secondly*, to the female; and view in succession the *mental*, the *functional*, and the *organic* states, from which impotence and sterility most frequently proceed.

5. I. Impotence in the Male — *Agonia, Agenesia, Impotentia Generandi Masculina, Sterilitas Paterna, Dyspermatismus, Dyspermasia,* Auct. var. — *Male Sterility* — may depend upon — 1. Mental influences or causes; — 2. Functional disorder; — and, 3. Organic lesions of the sexual organs. — 1st. *Mental influences or causes* may occasion *temporary*, or more or less *prolonged, impotence,* even in persons of a sound constitution in every respect. In them, the removal of the cause leaves the generative organs in a condition capable of performing their functions. The moral or mental influences, which most frequently occasion impotence, are, chiefly, too eager, too violent, or overexcited desire, affections of the imagination, and the depressing passions. Fear of incapacity, or of not being loved, timidity, shame, disgust, hatred, jealousy, surprise, terror, or any of the more violent mental emotions, most commonly have this effect. The first of these causes is, however, the most frequent; and the second, — the influence of the imagination, — the most powerful and permanent. In former times, when superstition, and a belief in the power of magicians, of incantations, of sorcery and witchcraft, prevailed, the state of the imagination was often not only the cause, but also the cure, of this affection; and, whilst incantations and other modes of impressing the mind were resorted to, for the purpose of destroying sexual power, amulets and charms were worn, not only for the purpose of guarding against their effects, but also for the restoration of this power, when lost or impaired. In the East and in Egypt, in Greece and in Rome, in uncivilised countries and in the seats of civilisation, until a belief in witchcraft ceased, these means were daily resorted to, as well as others, which could operate only through the medium of the imagination. The bane and the antidote were both confided in, however obscure, or impenetrable, or even absurd, either of them might have been. Montaigne was the first to penetrate and to expose the mystery of their operation. The twentieth chapter of the first book of his *Essays* will be read both with interest and instruction; and the thirty-seventh chapter of the second book will he found not less profitable to the practitioner of the present day.

6. 2d. *The generative function may be variously impaired,* and by diversified causes. — M. Virey remarks, with his accustomed desire of effect rather than of accuracy, that "the genital organs offer two states during life in the young and old, which are the frozen zones of existence, the intermediate period being the torrid zone of life. The child has nothing to give, the old has lost all." Instances, however, occasionally occur of genital precocity; and those in which the function continues till a late period of life, are by no means infrequent. The generative function appears with puberty, and continues until the sixty-fifth year, or even much later, unless impaired by excesses, or by local or constitutional disease. During, however, this long period, numerous circumstances tend to weaken or permanently to destroy it. The constitution and energy of the parents are sometimes the cause of the imbecility of the offspring. Children from premature connection, or of exhausted, aged, or worn-out persons, often inherit the incapacity of their parents, in respect both of the function in question, and of the system generally. Those, who are thus *hereditarily* or *constitutionally* impotent, are of a leucophlegmatic or lymphatic temperament; their soft solids, especially the fibrous and muscular structures, are soft, lax, and weak; their forms are rounded, from the superabundance of cellular and adipose substance; their hair is soft and fine, and deficient on the face and pubes; their frames are delicate and feminine; their voices are shrill, clear, sharp, or weak; and their testes are small and soft, the cords and scrotum being soft, lax, and pendulous.

7. Functional impotence is most commonly caused by premature or excessive venereal indulgences, and especially by the pernicious crime of manustrupatio. By these most injurious habits, the organs are excited to action before they are fully developed, and the seminal fluid excreted before it is duly elaborated. The muscles concerned in the generative function, and those also of the lower extremities, are either imperfectly formed, or have their energy remarkably impaired, so that they become susceptible, vacillating, and ultimately nearly paralysed. The imagination is morbidly acute or excitable, and erection imperfect, or frequent and momentary. The seminal and prostatic secretions are consequently weak, thin, clear, scanty, and serous; the whole frame, and particularly the nervous system, languish, and become enfeebled by the too frequent discharge of a fluid essentially vital, partly recrementitious, and necessary to their support; and ultimately the testes emaciate, or become soft. The variety of impotence noticed by Dr. Paris, depending upon a want of consent between the male organs of generation; or that in which erection takes place without discharge, or in which this latter occurs too quickly, and after imperfect erection; is most commonly the consequence of the causes just mentioned. But, in such, the evacuation consists chiefly of the prostatic fluid. General debility, from imperfect or unwholesome nourishment, may weaken the procreative energy, or render the desire less frequent, but it rarely destroys it altogether, or even for a time. Severe diseases, intense application to study, or to abstract inquiries or pursuits, have a still more remarkable effect in impairing, or temporarily destroying, the generative functions. In some instances, prolonged disuse of this function is followed by wasting of the testes, and, consequently, permanent impotence is the result. These organs, like others of the œconomy, are strengthened by moderate use, are weakened by abuse; their functions being often entirely lost by protracted disuse.

8. There are various other causes which may occasion functional impotence, particularly in certain constitutions; as the use of narcotics, espe-

cially of tobacco, hyoscyamus (Marc), cicuta, and opium. The sedative gases (Fodéré), particularly carbonic acid gas, may produce it. Various refrigerants have a similar influence, as nitre, the carbonates of soda, camphor (Diemerbroeck and Lossius), and some cooling diuretics. The smell of camphor has long been considered as anaphrodisiac; and colchicum has certainly this effect, as noticed by Dr. Beatty. Soda water also exerts the same influence. The effect of these, however, are only temporary or partial. — Injuries of the spine or spinal cord, or of the head, particularly the occiput (Marcellus Donatus, Fabricius Hildanus, Hennen); venæsection behind the ears (Hippocrates); arteriotomy, &c.; have been considered causes of impotency. Of the influence of the first of these there can be no doubt. The use of mercury has been assigned as a cause; but it can hardly be viewed as such, unless carried to excess.

9. 3d. *Organic lesions* occasioning impotency, are — (*a*) Diseases of the generative organs or of adjoining parts; — (*b*) Malformations of these organs; — and (*c*) Deficiency of one or more of them. — Anaphrodisia from the *first* of these is often only temporary or relative; but from the *second* and *third*, it is generally absolute and permanent. *A*. The *diseases* which most frequently cause impotency are — *firstly*, those of the penis; *secondly*, of the testes; and, *thirdly*, of adjoining parts. *a*. The *penis* may be so excessively irritated as to occasion a temporary impotence by obstructing the opening of the seminal ducts and the urethra. Much more frequently, however, complete or partial paralysis, or deficient energy of the nerves, and consequently of the muscular and vascular action of the organ, occurs, constituting the *anaphrodisia paralytica* of authors. This latter state is merely an aggravated form of functional impotence, and most commonly produced as above stated. A singular instance in which the cells of the corpora cavernosa were apparently disorganised or altered by inflammation and suppuration, so as to prevent the influx of blood, and consequent distention of the penis, and to occasion impotence, has been recorded by Mr. Callaway. A similar change to this may take place in one side of the organ, and have nearly the same effect upon its functions.

10. Various obstructions to the seminal discharge occasion temporary or permanent impotency. The chief of these are strictures of the urethra, and disease of the seminal ducts. Fodéré (*Med. Leg.* lib. i. p. 382.) adduces two cases, in which the powers of copulation existed, but without the seminal discharge. In one, the ducts were obstructed by hard concretions; in the other, they were constricted and callous. As stated by Dr. Beatty, the opening of the conjoined ducts of the vasicules seminales and vasa deferentia may be closed by scirrhous enlargement of the neck of the bladder, by enlargement of the prostate gland, by scirrhosity of the verumontanum, or by lesions of the duct itself. Strictures of the urethra can hardly be considered a cause of impotency, unless they are so extreme as not to permit the passage of a fine bougie. In the states of disease just mentioned, the inability of procreation arises from obstruction to the discharge of the seminal fluid, which is duly secreted; and when the obstruction is seated in the urethra, it may be removed by modern surgery. M. Fodéré and Dr. Dunlop state that double scrotal hernia, by pressing upon the spermatic cords, sometimes causes as complete emasculation, as if the testes were entirely removed.

11. *b*. Impotency may also depend upon organic *lesions of the testes* — upon scirrhus, carcinoma, fungoid disease, or scrophula of these organs. But unless the whole structure of both organs be changed, the faculty of procreation may not be entirely or permanently lost. Uncommon smallness of these organs may occasion only temporary impotency; for this state may depend upon delayed evolution, or arise from the wasting consequent upon disuse. Mr. Wilson mentions the case of a person, twenty-six years of age, in whom the penis and testes remained of the same size as in childhood. He married at this age, and at twenty-eight, the organs had reached their natural size. When, with smallness, there are remarkable flaccidity and softness conjoined, impotency is much more complete and even permanent. In a case of this kind in a strong young man, sometime under my care, no benefit resulted from treatment. Severe *bruises* of the testes may be followed by wasting or disorganisation of them. Dr. J. G. Smith alludes to this mode of making eunuchs, and states that it sometimes failed. I believe that most of the instances in which impotency has been said to have been produced by riding, have been owing to bruises or injury of these organs, or to the pressure to which they have often been subjected. Wasting of the testes may, however, arise without any very obvious cause. In the extreme case in which I was consulted, I was unable to ascertain its source. It occurred in a most robust and muscular young man, who would not admit that he had ever had recourse to excessive or vicious indulgence, or that he had been unusually continent, until his inclination ceased with the decay of the organs. Fodéré states that it was a common disease among the labourers in the canal at Arles; and Larrey, that it was not uncommon among the French troops on their return from Egypt. It has sometimes occurred as a consequence of the metastasis of *Cynanche parotidæa* to the testes. — *Induration* of these organs, independently of scirrhous disorganisation, may be so great as to destroy their functions. According to M. Andral, the seminiferous tubes are entirely obliterated, and the structure of the organ is hard, homogeneous, and without trace of organisation in cases of extreme induration. Impotence from inflammation of the testes is only temporary.

12. *c*. The *lesions of adjoining parts* occasioning impotency, are chiefly, uncommon obesity, very large scrotal hernia, and hydrocele. Neither of them requires any mark. A varicose state of the spermatic veins may also have this effect, when it is very remarkable. But I am unacquainted with cases in which this cause has been assigned.

13. *B*. *Malformations of the male genitals* may occasion impotency. Great size of the penis is seldom, and smallness of the organ is, perhaps, never a cause of it, if the functions of the testes are duly performed. According to Zacchias, Fodéré, Beatty, and others, excessive size, particularly excess in length, may produce relative or temporary impotence, by injuring the female organs. The chief malformations of the penis having this effect absolutely or permanently, are those in which the urethra terminates in the pe-

rineum; and even in these, impregnation may be accomplished by art. John Hunter was consulted in a case of this description, and was induced, by the experiments of Spallanzani, to recommend the patient to collect the seminal fluid emitted from the perineum during intercourse, and to inject it into the vagina. Impregnation took place, and a healthy child was born in nine months.

13. In cases where the urethra opens in a part of the penis admitting of being introduced within the vagina, impotency may exist, but it is only relative; for procreation may be effected when the opening is thus situated, whether it be on the dorsum (*epispadias*), or on the inferior surface (*hypospadias*), as more frequently observed. Numerous instances are recorded by Simeons, Belloc, Kopp, Blundell, and Foderé, of impregnation by persons in whom these malformations existed. Mr. J. Hunter met with a case, in which the epididymis terminated in a cul-de-sac, instead of passing to a vas deferens. Dr. Beatty states, that a similar conformation sometimes exists in the vesiculæ seminales, where, instead of entering the urethra, they terminate, after being joined by the vasa deferentia in shut sacs. When these formations of the excretory ducts of the testes exist on both sides, absolute impotency necessarily results, but they are extremely rare.

14. *C. Deficiency of one or more of the male organs* occasions absolute or relative impotency. *a.* Congenital deficiency of the *penis* is rarely observed, and complete deficiency, still more rarely. Mr. Foderé mentions a case in which no vestige of the organ existed from birth. The testes were perfect, and sexual desire was not impaired. In most of the instances of congenital partial deficiency or malformation of the *penis*, recorded by authors, the urinary organs presented other malformations, particularly in respect of the urinary bladder and ureters. This is illustrated by several cases in Dr. Duncan's Memoir on this subject. (*Edin. Med.* and *Surg. Jour.* vol. xxv. p. 31.). *Accidental* deficiency of the penis is sometimes met with. The organ may have been either amputated or destroyed by disease. Some years ago, a surgeon, a friend of the author, was sent for in great haste. He found a man in a state of syncope from hæmorrhage proceeding from a very recent amputation of the penis close to the pubis. The strictest secrecy was preserved as to the cause and mode of amputation, which had evidently been effected by a sharp instrument.

15. The glans penis, and indeed the greater part of the organ, may be lost without causing more than relative impotency; and possibly, nearly all of it may be removed without producing an absolute loss of the procreative faculty, if the means resorted to by John Hunter (§ 12.) be employed. Instances of extensive mutilation of this organ, without destroying this power, are referred to by Frank, Paris, Beatty, and others; and although there is every reason to conclude that a complete removal of the penis will generally occasion impotency, yet the proper function of this part being to excite the female organs, and to convey the prolific fluid to the parts destined to receive it, if these purposes can be at all accomplished, impregnation may follow.

16. *b.* Congenital deficiency of the *testes* is rarely observed; and most of the cases in which these organs have been said to have been wanting, are merely instances of their retention in the abdomen. When they are not found in the scrotum, their entire absence can be inferred only from the history of the case, and from the state and appearances of the patient; for when they are altogether wanting, the usual characters of the male are partially lost, and those of the female assumed. As delay in the descent of the testes may arise from some imperfection, or delay of development, as J. Hunter reasonably infers, certain of the female characters may be presented, and yet these organs may exist nevertheless. The question then is, whether or not, the state of development, to which they may have attained, is sufficient for procreation. M. Marc adduces the case of a person of a feminine appearance, who yet possessed the full procreative power. The external characters cannot therefore always be confided in; but when all the external appearances of virility are present, although the testes are not found in the scrotum, there is every reason to infer that impotency does not exist; for numerous instances are on record proving that the mere retention of these organs within the abdominal ring does not affect the procreative power.

17. The congenital absence, destruction, or removal, of one testis is not a cause of impotency. It may however be a cause of relative incompetency and even of complete impotence, if the remaining one be soft, small, or withered. Castration, or the removal of both testes is followed by complete and permanent impotence, if it have been performed before puberty. But, subsequently to this period, the power of procreation may exist for a very short time after its performance, owing to the seminal fluid collected in the vesiculæ seminales previously to the operation. M. Marc supposes that the time taken for the cure of the wound is sufficient for the absorption of this fluid into the circulation; but the cases adduced by M. Boyer and Sir A. Cooper prove that a temporary power exists or is retained until the vesiculæ seminales are emptied. On this subject, the works of Paris and Beck will be consulted with advantage, for it hardly comes within the scope of this work.

18. II. Impotence and Sterility in the Female. A female may be impotent but not sterile, and she may be sterile, but not impotent; for, as respects the former condition, a state of the sexual organs may exist sufficient to prevent intercourse, and yet, upon its removal, impregnation may take place; and, as regards the latter condition, perfect competency to intercourse may exist, and yet conception may never occur. She may also be both impotent and sterile, or, in other words, were the impediment to due intercourse entirely removed, impregnation might not be effected. Sterility is very much more common than impotency in the female, and even than impotency in the male.

19. *A. The causes of* Impotence *in the female* are an impervious state of the vagina, absence of this canal, remarkable constrictions of it, the division of it by a septum running downwards from a double uterus, adhesions of the sides of the vagina, or of the labia, and the termination of the passage abruptly in a cul-de-sac. An impervious vagina may arise from changes in the soft parts, consequent upon protracted inflammation or irritation, the passage becoming first constricted or remarkably contracted, and ultimately obliterated. In a case respecting which I was consulted, a recto-vaginal fistula, seated at the upper part of the va-

gina, had occasioned so remarkable a contraction of the vagina, that its canal was almost obliterated, its parietes having become callous and indurated, A similar result may also follow a vesico-vaginal fistula. **Fodéré** believes, that malformations of the bones of the pelvis may be so great as to prevent intercourse, but this can hardly be the case. Exostoses, however, on the internal or inferior surface of the bones of the pubis may have this effect, but their occurrence in this situation, and to this extent, must be very rare. Congenital absence of the vagina has been met with by **Villaume**, **Moulon**, **Syme**, and **Warren**; and absence of both vagina and uterus by **Mott**, **Davis**, **Macfarlane**, and others. In a case adduced by **Foderé**, the uterus and vagina were found, upon dissection, to constitute one solid mass, without any cavity in either. In a child, examined after death by **Hufeland**, no trace of genital organs, peculiar to either sex, was found, externally or internally. Although such instances are rare, there is no doubt that one or more of the different parts forming the female organs may be wanting. Congenital narrowness of this passage has been observed in a very few instances. In one or two of these, however, impregnation occurred, and the passage became enlarged in the progress of gestation. Contraction of the vagina was said to have existed in the celebrated Joan of Arc. The division of the canal by a septum has been met with in a very few cases only. Firm adhesions of the labia pudendi are not unfrequent in children, in consequence of neglected excoriation or inflammation. I have seen several instances of these adhesions of various extent, duration, and firmness. They are more rare in females after the age of puberty; but they have been met with at this age by **Benevoli**, **Merriman**, **Ryan**, **Tucker**, and others, and in some cases, they have been so complete, as nearly to prevent micturition. Inflammation or injuries, by instrument, or otherwise, during parturition, have been followed by adhesion of the sides of the vagina, and total obliteration of the canal. Several of the instances of obstruction by a strong membrane placed at the commencement, or in some part of the passage, recorded by **Fabricius Hildanus**, **Ruysch**, **Ambrose Paré**, **Benevoli**, **Foderé**, **Physick**, and others, may be imputed to adhesions long previously formed, which have subsequently assumed an organised and membranous state, rather than to an inordinately firm and resistant hymen. The hymen may, however, be thickened and hypertrophied, and be a cause of impotence by preventing intercourse. Yet impregnation may be effected nevertheless, as proved by numerous cases. This state of the membrane is therefore not productive of absolute impotence, even should it be allowed to continue; and it is not a permanent cause, as it may always be removed by an operation. Complete prolapsus or procidentia of the uterus, retroversion of the uterus, prolapsus of the vagina, cancer of the vagina or uterus, and extreme brevity of the vagina, are generally productive of impotency, although impregnation has occurred in rare instances, notwithstanding these lesions.

20. *B.* **Sterility** may proceed from absence of the uterus, or of the ovaria, or of both. When the uterus is wanting, the vagina is usually short. It may also proceed from a scirrhous or indurated state of this organ, from tumours in its substance, from polypi in its cavity, or attached to its neck, from occlusion of the Fallopian tubes, or adhesion of their fimbriated extremities to adjoining parts, from narrowness or entire obstruction of the os uteri, and from disease of both ovaria. Several of these require further remark. Extreme constriction of the os uteri has been shown by Dr. **Macintosh** to be productive of difficult, painful, or obstructed menstruation, and it most probably is also one of the causes of sterility. The mouth of the uterus may be completely obstructed by agglutination of its sides, or by a false membrane stretched across it, either internally or externally. The openings of the Fallopian tubes may be also closed by a membranous production, or by an albuminous exudation from the internal surface of the uterus. The tubes may be either partially or altogether obliterated, in consequence of the extension of inflammatory action to them, from the uterus or adjoining parts. When these alterations extend to both tubes, sterility must necessarily result. Although tumours developed in the body or neck of the uterus, and polypi attached to its internal surface, generally prevent impregnation, yet instances have occurred, in which conception has nevertheless taken place. These are however, very rare, and abortion has always occurred during the early months. A tumour or polypus may be formed on the internal surface of the uterus, and yet after its removal, the patient may conceive and bear a child at the full time. A case illustrative of this has been recorded by Dr. **Beatty**.

21. The above causes are mostly productive of absolute or permanent sterility; but there are others, which are either relative, or admit of removal. These are chiefly, too profuse, or too frequent, and difficult menstruation, constant or profuse leucorrhea, inflammatory affections of the uterus, or of its appendages, dislike, disgust, and indifference on the part of the female, &c. Profuse or frequent menstruation is a more common cause of sterility than is generally supposed; this state, particularly when associated with irritation of, or increased vascular determination to, the womb, preventing the retention of the ovum, until it has undergone the changes necessary to its attachment to the uterus. Leucorrhea is a cause of sterility chiefly when it depends upon inflammatory irritation of the internal surface or neck of the uterus, or when the secretion proceeds from relaxation of the vessels in this situation. When it is a consequence of inflammatory action, sterility may continue after the discharge has ceased, owing to organic changes in the surface of the uterus, or in the Fallopian tubes, especially the formation of a false membrane in the former, and the production of an albuminous exudation in the canals of the latter, or consequent obliteration of them. When barrenness depends upon leucorrhea proceeding from local relaxation, or general debility, it may be removed upon the disappearance of its cause. Delayed, retained, obstructed, or suppressed menstruation frequently occasions sterility. Some females have, however, conceived, who have never menstruated; and the mere suppression or obstruction of the catamenia may or may not prevent impregnation; various other contingent changes, or concurring circumstances, either favouring or preventing this result. Difficult menstruation is sometimes a cause of sterility, but its influence also will depend much upon other circumstances. That form, however, of dysmenorrhea, described

by Dr. DUNCAN and Dr. DEWEES, which appears to depend upon the formation of a membranous substance in the uterus, having a strong resemblance to the decidua, is very generally productive of barrenness; but this is only one of the several forms which subacute or chronic inflammation of the uterus assumes, either of which may occasion temporary or permanent sterility.

22. There are other causes of temporary or relative sterility. Among these the most common are too frequent, yet inefficient sexual intercourse, too early marriages, general ill-health, and debility or exhaustion of the female organs, owing to premature or too frequent excitement. Various circumstances connected with sterility in prostitutes have, perhaps, thrown some light upon certain of the causes of this state; and particularly the fact, that many of this class have had children after marriage, or after relinquishing promiscuous intercourse. Numerous instances have occurred of females who, having been obliged to marry contrary to their inclinations, have not conceived, and yet have had children from a second marriage. It is generally understood by females of all ranks in society, that indifference during intercourse, or suppression of the orgasm will prevent impregnation; and, although they are sometimes deceived in this respect, yet their inference is correct in the majority. This is one of the principal causes of the sterility of prostitutes, other circumstances, however, besides those just alluded to, combining with it, to produce this effect in them.

23. III. TREATMENT. The treatment of impotence and sterility depends entirely upon the causes of either the one or the other, as far as they can be known. Many of these causes may be fully ascertained, and the consequences correctly anticipated; but as to the existence of others, inferences only can be drawn from a number of circumstances, and these inferences cannot be always fully confided in. Most of the organic lesions and deficiencies, enumerated above, cannot be remedied, yet a few of them may be assisted by art, either temporarily or permanently. But many of the functional and moral causes, and their effects, may be entirely removed. Absence of an organ or part essential to the function of generation in either sex is generally productive of impotence and sterility. Yet an imperfection only, and disease, of one or more of these organs occasioning either inability in the male or barrenness in the female, may be remedied. Adhesions of the prepuce to the glans penis, phymosis, strictures of the urethra, fistulous openings in the course of the urethra, some of the diseases of adjoining parts that prevent intercourse, paralytic and debilitated states of the penis, and the slighter injuries of the testes, may be permanently removed, and their consequences disappear. Contractions of the vagina, and even constriction or narrowness of the os uteri, occlusion of the entrance of the vagina by adhesions of the labia, or by a morbidly dense hymen, or by a false membrane, prolapsus or procidentia of the uterus or vagina, uterine polypi, leucorrhea, difficult or painful menstruation, and inflammatory states of the uterus may be severally remedied, and, although sterility may not be always, it will be frequently, also removed.

24. Cases of impotence and sterility from moral and functional causes are the most common; and, although they require the most scientific and judicious treatment, yet the mental, as well as the physical imbecility, that often characterises them, brings them more frequently in the hands of pretenders and empirics, than in those of the qualified practitioner. The cases which proceed from these causes may be arranged into 1st. Those which depend upon exhaustion; 2d. Those which proceed from disuse, or from an imperfect exertion, of the function; and, 3d. Those which arise from excessive mental and physical excitement, relatively to the susceptibility and sensibility of the nervous system.—*a.* When impotency and sterility proceed from *exhaustion*, or from a premature decay of the generative functions, owing to premature, unnatural, or excessive excitement, the treatment is nearly the same in both sexes, according as either may be chiefly or solely affected. In these cases the indications are, to restore — 1st. The energies of the constitution; and 2d. The functions of the procreative organs. To attempt the second, without either previously or contemporaneously fulfilling the first indication, will generally be futile, and often injurious. Persons, who are thus exhausted, sometimes perpetuate their infirmity by having recourse to noxious excitants, and to the means advised by empirics. The scientific practitioner will be guided in the selection of remedies, by the causes, circumstances, and phenomena, connected with the case; and he will find it necessary to associate a moral or mental regimen with the physical means which may be required. When the affection depends upon an excited imagination, in connection with a depraved habit, the former part of the treatment is the most necessary, but the most unpleasant for the physician to prescribe, and the most difficult for the patient to adopt. In these cases the mental weakness has advanced, *pari passu*, with the constitutional and local infirmity, until the mind has become incapable of exerting its more reflecting and moral powers. It will, therefore, be often necessary to restore the energy of the nervous system by suitable diet, appropriate medicines, regimen, occupation, and change of air, before the moral part of the treatment will receive due attention from the patient.

25. In other and slighter cases, the debility is principally local, the general health as well as the mental energies, remaining only partially or but little impaired. In these, the local, constitutional, and moral means of cure, will frequently prove successful, especially in the male. In this sex, when the inability depends chiefly upon weakness of the sexual muscles, invigorating modes of treatment, general and local, usually remove it, if its causes be avoided. In all these, attention to the digestive and secreting functions, vegetable or mineral tonics, especially the preparations of iron, and chalybeate mineral waters, the shower bath, or the cold salt-water bath with regular exercise in the open air, mental occupation, and early hours, will generally be most beneficial. Where the patient is subject to discharges from the urethra upon passing a stool, or on the excitement of sexual desire, a turgid and irritable state of the prostate gland may be inferred. When he is liable to frequent emissions during sleep, an irritable condition of the testes, and of the *vesiculæ seminales* obviously exists. In these, the more cooling tonics and the more astringent chalybeates may be employed, particularly the mine-

ral acids, alone or with bitter infusions, and the tincture of the muriate of iron, aided by the regimen already stated. When the general and local astheniæ are great, a moderate use of wine, of warm spices and aromatics, with as full and nutricious diet as the digestive organs can dispose of, will also be requisite. But the mental and local causes of sexual excitement should be avoided, so that the function should not be exerted beyond what may be necessary to restore and to fortify it.

26. When impotence in the male depends upon a too frequent exertion of the sexual function, the means of cure are sufficiently obvious. Yet the patient may be unable, from mental or nervous weakness, to exert the control necessary for its cure. In such a case the usual restorative remedies should be prescribed, especially chalybeates and cold sea-water bathing. In most of these, the male organs are so irritable, that their functions are performed too rapidly and imperfectly, or before the organs, more or less necessary to procreation, can be excited in the female. At the same time, the male secretions are inadequate, particularly in respect of elaboration and retention in the *vesiculæ seminales*, for the accomplishment of the purpose for which they are intended. This form of male impotence and sterility is commonly produced by masturbation, and is most benefited by whatever will improve the general health, and restore the tone of the sexual organs. Attempts at intercourse in these cases should not be more frequently than may strengthen or promote the function, without exhausting or weakening it.

27. The *other states* (§ 7, 8.) of functional impotence and sterility above alluded to, hardly require a particular notice, as they are temporary only, and soon disappear, as circumstances generally arise which soon remove their causes. It is, indeed, chiefly to the removal of the causes, that the attention of the physician should be directed, in the treatment of this complaint in both sexes.

28. In ancient times, and recently in some countries, both civilised and savage, the removal of impotency and sterility by the use of heating substances, supposed to possess aphrodisiac properties, was generally attempted. The prematurely aged, worn out debauchees, and the community generally, in some parts, especially in China, Japan, Africa, &c., often employ substances which are reputed to possess these properties. But the effects they produce, when they produce any, are more commonly injurious than beneficial. Musk, ambergris, cantharides, phosphorus, opium, the hot spices, aromatics, coffee, vanilla, borax, genseng, castor, saffron, &c., are supposed to possess aphrodisiac virtues; and a diet consisting principally of fish or of shell-fish, has a similar repute. Circumstances may arise in which it may be proper to prescribe certain of these, as possessing stimulating and restorative properties; but others of them ought to be employed with extreme caution, particularly cantharides, phosphorus, and borax. The nostrums said to possess the virtues in question ought not to be resorted to. Certain articles of food, as pigeons, eggs, particularly raw or undressed eggs, caviàre, herrings recently pickled, oysters, truffles, &c., may be employed, as being at least harmless; but the less that heating medicines are prescribed the better, unless under certain circumstances, which may occur to require them; as in cases where the sexual function has not been restored after exhausting and depressing diseases, or after prolonged exertion of the mind on abstract subjects. I was very recently consulted by a gentleman about forty, who had no return of the sexual function after a severe attack of influenza a twelvemonth before. He had perfectly recovered from it in other respects for several months, and the remaining imperfection was a source of distress to him. In a case of this kind, the physician should at least know the means most likely to be of service, particularly as the inability may become a matter of family trouble, as well as of individual misery. KÆMPFER states, that a combination of musk, ambergris, opium, and aromatics, in the form of small pills, are much employed by the Chinese and Japanese as an aphrodisiac; and I believe that it is not without some degree of efficacy. But it is very obvious, that the prolonged or too frequent recourse to these and similar substances is most injurious, both morally and physically.

29. The *sterility of females* must be treated with strict reference to the causes, as far as they may be ascertained or inferred. When it is chiefly functional, and induced by exhaustion, or by the noxious practices already alluded to, the means of cure are very nearly the same as have been here recommended, especially attention to the digestive and uterine functions, the use of chalybeates, or of chalybeate or other tonic mineral springs, with air, exercise, and early hours. For them also, the cold salt-water bath, the shower bath, or the salt-water *douche* on the loins, will also be of great service. The importance of a due regulation of the mind, of healthy occupations, and of abstemiousness, should be duly estimated.

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INDIGESTION.—Syn. Δυσπεψια (from δυς *with difficulty*, and πεπτω, *I digest*), βραδυπεψια, απεψια, Gr. *Concoctio tarda*, *Stomachi resolutio*, *Cruditas*, *Indigestio*, *Passio Stomachia*, Auct. Lat. *Apepsia*, Vogel. *Soda*, Linnæus. *Anorexia*, Sagar. *Bradypepsia*, Sauvages. *Dyspepsia*, Swediaur, Cullen, Parr. *Dyspepsia Simplex*, Young. *Limosis Dyspepsia*, Good. *Schwere Verdauung*, *Uebel Verdauung*, Germ. *Indigestion*, Fr. *Indigestione*, Ital. *Bad digestion*, *Slow digestion*, &c.

Classif. — 2. *Class*, Nervous Diseases; 2. *Order*, Defect of Vital Energy (*Cullen*). 1. *Class*, Diseases of the Digestive Function; 1. *Order*, Affecting the Alimentary Canal (*Good*). I. Class, I. Order (*Author*, in *Preface*).

1. Defin. — *Impaired or fastidious appetite; slow and difficult digestion; sensations of discomfort referrible to the stomach, and frequently costiveness.*

2. *Dyspepsia* or *indigestion* has been employed as the generic designation of several disorders ranged under it as species, by most modern writers, and particularly by Sauvages and Cullen. Young and Good have limited the meaning of the term, by considering some of those disorders as altogether distinct from it. Dr. Todd, however, in an able and comprehensive article on the subject, has applied this term to all the functional disorders of the alimentary canal. Having discussed several of the affections viewed by some writers as species of indigestion, in separate articles, according to their natures and seats (see articles, Cœcum, Colon, Costiveness, Duodenum, Flatulency, Pyrosis, Stomach, *Painful affections, and inflammation of*), my observations, at this place, will necessarily be confined to the simpler forms of this disorder.

3. *Indigestion* is either *primary* or *secondary*,—*idiopathic* or *symptomatic*, *simple* or *complicated*. When it is *complicated*, it may have been either the primary or the secondary affection. Dr. Todd distinguishes between symptomatic and sympathetic dyspepsia; and remarks that, "a *secondary* dyspepsia may be conveniently divided into *symptomatic*, forming only a part of a more general disease, and *sympathetic*, the consequence of consent with the disorder of some other organ." The distinction is, in some respects, wanting in precision, but it may be preserved as being one usually recognised.

4. The *varieties* or *forms* of indigestion have been variously described, named, and arranged, by the numerous recent writers on this disorder; and a most eager disposition has been evinced by all, to assign new terms, and to devise distinct pathological states, for each. In some instances, distinctions have been multiplied to an extent bewildering the inexperienced, and beyond the actual morbid manifestations of the organs affected. It will be readily admitted, that different forms of indigestion will depend upon different states of the stomach, and of its associated viscera; that, in one, the organic sensibility will be especially affected; in another, the secretions; in a third, the muscular contractility; in a fourth, the circulation; in a fifth, two or all of these functions; and that these particular affections will be variously associated with disorders of the liver, or of the pancreas, or of the duodenum, and not merely with these, but with others in remote organs. Yet these individual affections, even in their simpler or less complicated states, will seldom be manifested by symptoms enabling the most close observer to determine, with precision, which of them is the one actually present, either in a simple or predominant form, or the exact associations to which it may have given rise. It will, therefore, be proper not to multiply distinctions beyond those which will be found useful for practical purposes. The disorder which proceeds from a simple diminution of the functions of the stomach,—from impaired secretion, weakened organic contractility, and languid circulation—from asthenia of the organ,—will, with propriety, form one variety of indigestion; and that which depends upon a state of erethysm, or vascular irritation, approaching, but not amounting to, inflammation of the villous surface, will constitute another. This latter, especially, will present certain modes, according as the sensibility, the villous membrane, or the follicular apparatus, is prominently affected. Those states of disease which are generally consequent upon dyspepsia, although sometimes appearing independently of it, and which have been classed by some writers as severer forms of this complaint, will be found under the heads referred to above.

5. I. Description. — i. Simple Asthenic Dyspepsia; — *Stomachi Resolutio*, Celsus, — *Frigiditas Stomachi*, Prosper Alpinus, — *Dyspepsia Idiopathica*, Cullen, — *First Stage of Indigestion*, W. Philip, — *Atonic Gastric Dyspepsia*, T. J. Todd, — *Dyspepsia per Asthenie de l'Estomac*, Andral, — *Dyspepsia Apyrétique As-*

thénique, **BROUSSAIS**; — is *characterised* chiefly by a sense of distention of the stomach, by acrid or acid eructations, and flatulence, soon after a meal; by loss of appetite, or loathing of food, and occasionally by nausea. These symptoms, however, vary with the nature and quantity of the food. Heartburn, nidorous or putrescent eructations, and a feeling of weight or oppression at the epigastrium, are generally present after a very full meal, particularly of fat, oily, or rich meats. The tongue is pale, flabby, whitish, slimy or coated, and often indented by the teeth; the bowels are costive, sometimes irregular; the urine is pale, copious, and occasionally deficient of urea, or contains albumen; the pulse is softer, weaker, and often slower than natural; the temperature is diminished, or irregularly distributed, the extremities being cold, and the surface pale, or flaccid; the eyes are languid, and the physical and mental powers deficient in vivacity and energy. The symptoms, however, vary much in grouping and intensity with the kind, quantity of the solid and fluid ingested, with the temperament and constitution, and with the manner in which associated viscera are sympathetically affected. In some cases, they are gradually and very slowly developed by the continued operation of the causes; in others, they are more rapidly or suddenly induced by errors in diet, or by other powerful circumstances.

6. *A.* The latter, or the *more acute* and *sudden attacks of indigestion*, are generally consequent upon some manifest cause, particularly an overloaded state of the stomach, — and is identical with the *cruditas* of the ancients, and the *embarras gastrique* of the French. — It may occur, however, from substances which disorder the organic sensibility of the viscus, or from other causes. When it proceeds from this source, the symptoms soon follow a full meal, or appear in the morning. The patient experiences various uneasy or even painful sensations, with oppression or weight at the epigastrium, and heart-burn. These often extend to the pharynx. The tongue becomes dry, clammy or loaded, and the taste is lost or perverted. Rancid, oily, indigested, or acid substances are eructated or brought off the stomach, without nausea or retching. There are generally headach and languor. If nausea and vomiting take place, the contents of the stomach are thrown up, either partially or altogether undigested, with a ropy phlegm. Where vomiting does not occur, a sense of irritation or constriction of the fauces and pharynx, with a copious secretion of a watery fluid, and pains in the stomach, are often present. The appetite is abolished, or savoury articles of food are only relished. When the fit of indigestion occurs during the night, the patient experiences frightful dreams, or the nightmare, or spasmodic twitchings of the limbs, or severe pains in the stomach or bowels, or wakens with severe headach. The pulse is weak, languid, or soft; the skin cool and moist, and the extremities cold. Frequently chills, horripilations, formications, or even slight shudderings occur. Various sympathetic affections often attend this state of dyspepsia, particularly headach, as described in that article, impaired or indistinct vision; muscæ volitantes, noises in the ears, and dullness of *hearing;* disorder or impairment of the senses of taste and smell, palpitations, and vertigo, colicky pains in the abdomen, costiveness, &c.

7. An attack of dyspepsia in an acute or sudden form seldom appears, unless from the causes just alluded to. But it may proceed, particularly in delicate persons or females, from other causes, as powerful mental impressions, long fasting, or deprivation of wonted stimuli. In such cases, vomitings, or even retchings, rarely occur; but nausea or disgust at food, giddiness, headach, faintness, sinking or pain at the epigastrium, costiveness, palor and coldness of the surface, and inactivity, with irritability of temper, with some of the other symptoms already noticed, are commonly complained of. — These *acute* attacks are liable to pass into the more *confirmed* or chronic state of the complaint, next to be described, particularly when they recur frequently, or are neglected.

8. *B.* The *confirmed* or chronic form of dyspepsia may take place gradually or slowly, or as a consequence of the foregoing. In the former case, it is almost imperceptible in its progress, but it generally commences with symptoms of general, as well as local, debility. All the physical and mental functions betray more or less inactivity. The sleep is disturbed or unrefreshing, sometimes heavy or prolonged. The appetite in the morning is impaired and capricious, savoury articles being chiefly relished, and a sense of soreness or relaxation in the throat is often complained of. A full meal is followed by heaviness, yawnings, stretchings, and an almost irresistible disposition to sleep, by sense of fullness, weight, flatulence, or by rancid or acrid eructations, &c. As the disorder continues, the appetite is more impaired and more capricious. The bowels become costive or irregular; the discharges being scanty, offensive, discoloured, or more copious or frequent, and sometimes containing imperfectly digested portions of food. The biliary secretion is either insufficient or disordered. Perspirations are copious on exertion, often offensive, and quickly discolour the linen. Flatulence is troublesome, particularly when the stomach is empty; the mouth is clammy, and the tongue loaded or furred, especially in the morning. The countenance becomes pale or unhealthy; and the body occasionally enlarges about the trunk or abdomen. Vertigo, loss of memory, lowness of spirits, apathy, indifference; and numerous associated and sympathetic disorders supervene, according as the asthenia of the stomach extends to the duodenum and intestinal canal, or to the secreting collatitious viscera. In many cases, the affection extends along the æsophagus to the pharynx and fauces, occasioning the slightest forms of angina, or simple relaxation of the uvula.

9. As dyspepsia becomes confirmed, various additional sympathetic affections appear. Indeed there is scarcely a viscus, that may not betray disorder. Irritation about the larynx, chronic cough, particularly in the morning; huskiness of the voice, or hoarseness; copious perspirations, and eruptions on the skin; dry and parched state of the hair, or morbid condition of the cuticle and of the nails; great sensibility of cold, and also of heat; are very commonly observed. Shortness of breath on slight exertion; palpitation of the heart; intermissions and irregularity of the pulse; and other sympathetic disorders about to be noticed, often also appear. This variety of indi-

gestion, when neglected, or when its causes continue in operation, sooner or later passes into one or other of the forms of the variety, next to be described.

10. ii. INDIGESTION WITH VASCULAR ERETHISM, —*Irritative Dyspepsia; Cardialgia Inflammatoria*, SAUVAGES, — *Gatsrite Chronique*, BROUSSAIS, — *Second Stage of Indigestion*, W. PHILIP, — *Inflammatory Gastric Dyspepsia*, T. J. TODD, — is *characterised* chiefly by slow and painful digestion, a sense of heat and discomfort at the epigastrium, increased by food and by pressure, with thirst, dryness of the mouth and fauces, redness of the edges and point of the tongue, whilst the middle and root are white, loaded, or furred; costiveness, high-coloured urine, partially increased temperature and dryness of the skin, and a more frequent and sharp pulse than natural. It offers several *grades* of severity and various *modes*, according to the exciting cause, the temperament of the patient, and to the manner in which the organic sensibility and contractility, the secretions and associated viscera, are individually implicated. It may appear suddenly in an acute form, when the cause has been active, or gradually and slowly, either primarily, or consecutively upon the variety already described.

11. *a.* In the *slighter states* of irritative dyspepsia, the appetite is often increased, occasionally ravenous, in some instances impaired; thirst is generally present, particularly in the evening. The extremities are often cold; but burning or heat of the soles of the feet and palms of the hand frequently occur, particularly in warm or temperate weather. The point and edges of the tongue are red, the papillæ raised or excited, and the root more or less loaded; the bowels are confined, and the stools dry and scanty. The pulse is somewhat excited, especially in the evening, and rather sharp than hard or contracted. Headach, sometimes with slight redness of the conjunctiva and contraction of the pupils, heaviness, unsound sleep, unpleasant dreams, and a feeling of fatigue and lassitude upon waking, are generally present. The symptoms referred directly to the stomach, at first, are often not more severe in this, than in the preceding, variety; and pain, with tenderness on pressure, is not more frequently complained of. As the complaint, however, becomes more chronic, a burning pain is felt at the stomach, and is increased by a full meal and by pressure. Great discomfort and a sense of a load are referred to the region of this organ. Fulness or distension at the epigastrium, often extending to one or both hypochondria, is usually present. When heartburn occurs, it is characterised by a sense of heat or burning, and attended by redness and soreness of the fauces and pharynx. The tongue and throat are frequently dry, and the voice soon becomes husky on speaking, or on exerting it. Small vesications occasionally appear on the sides and points of the tongue, and more rarely excoriations on the fauces. In protracted cases, the tongue is often smooth, sometimes slightly fissured or chapped, or lobulated, or even glossy. Pain is felt in the left shoulder, or in the left hypochondrium, extending to the shoulder blade, or between the scapulæ, and beneath the sternum. Severe headach; irritability of temper; depression of spirits; impaired appetite; palpitations; a harsh, dry state of the skin, frequently with scaly eruptions; occasional bursts of perspirations during sleep; inability to lie on the left side; burning heat in the palms of the hands and soles of the feet; increased acuteness of the senses, or obscuration of certain of them; and a morbid state of all the excretions, severally appear, and often divert the patient's and practitioner's attention from the source of disorder. In some cases pain, often increased by flatulence, shoots through the hypochondria and chest, and a symptomatic cough, with slight greyish expectoration in the morning, is excited, owing to nervous connection, and to the extension of irritation to the pharynx and top of the larynx. In these, pectoral disease is sometimes suspected; and inflammatory irritation of the larynx may be actually thereby occasioned.

12. *b.* In the more *severe* or *acute attacks* of this variety of indigestion, particularly when produced by hurtful or indigestible food, or stimulating liquors, there is a total and sudden loss of appetite, with nausea, retchings, or full vomiting, increased by, or instantly following, the ingestion of substances into the stomach. Occasionally, the contents of the organ are regurgitated without effort or nausea, but with pain or a sense of constriction at the epigastrium and hypochondria. The pulse, is at times, but little affected; at others, quick and sharp, and the skin is harsh and hot; but perspirations break out when free vomitings are induced. There is always thirst; pain, or a sense of burning, of scalding, or of soreness is generally felt in the stomach, and it often extends, in the course of the œsophagus, to the throat; giving rise to a similar symptomatic affection of this part, and of the larynx and chest, as just noticed (§ 11.). In rare instances, however, where the retchings and vomitings are frequent and severe, but little pain, and no tenderness in the epigastrium are present, or much less than the severity of the symptoms indicates. The copious discharge from the mucous follicles and exhalents of the villous coat in these cases, removes the congestion of vessels, or the morbid conditions productive of pain and tenderness in other cases. But the symptoms vary remarkably with the exciting cause, with the temperament and disposition of the patient, and with the previous disorder and existing state of the collatitious viscera.

13. *c.* In the *aged*, or in *young persons of a phlegmatic temperament*, and in *cold* or *damp climates* and *seasons*, irritative dyspepsia assumes a form which has been denominated *Anorexia pituitosa, Anorexia Catarrhalis, Catarrh of the Stomach*, &c., by various writers. Dr. TODD has called it *Follicular Gastric Dyspepsia;* and most probably it proceeds from an inordinate and morbid secretion from the follicles of the stomach, that irritates the organ; but he has improperly confounded it with *Pyrosis*, which it closely resembles. It is characterised by an aching pain, by gnawing, or by a sensation of cramp, weight and uneasiness, or soreness, felt chiefly in the morning, when the stomach is empty, by loss of appetite, nausea, and sometimes by vomiting of a ropy, transparent, glairy, and tasteless fluid. It is often complicated with, or consequent upon, severe catarrhal affections of aged or phlegmatic persons, and is not infrequent in rheumatic constitutions, after errors in diet, and the use of indigestible, rich, or incongruous articles of food or drink. In this case, it usually occurs in the night and fol-

lowing morning. Along with indigested substances, a very large quantity of this colourless glairy matter is thrown up, and often continues to be ejected for a considerable time afterwards. M. ANDRAL has seen it thrown off in very large quantities, independently of the irritation of offending matters; but these matters are more commonly concerned in keeping up the morbid secretion. In most of the cases I have seen, the pulse was soft, languid, sometimes sharp during the attack, which was attended by a foul, loaded, or sodden state of the tongue, a warm perspirable surface, or free perspiration, much depression of nervous power, and constipation; but there was little or no thirst, nor tenderness or increase of pain on moderate pressure of the region of the stomach. Flatulence, eructations of an insipid or slightly acid fluid, a copious flow of saliva from the mouth, or of a watery fluid from the pharynx, and oppression or distension of the stomach, although pain is much abated, after eating, generally accompany the disorder. This form of irritative dyspepsia is often preceded or attended by severe catarrhs, by dyspnœa, or humoral asthma, or by rheumatic affections; and it is most common in cold and wet seasons, when these are prevalent. In its slighter or less acute states, or when appearing independently of over-distention or irritation of the stomach by bulky or indigestible substances, the pulse is usually slow or soft, the extremities cold, the evacuations scanty or mucous, and the tongue white, sodden, or loaded. As Dr. TODD remarks, there is a frequent desire to take food, with thirst, and, as the disease continues, there is wasting of the flesh. The uneasiness caused by the laborious digestion subsides as the process is finished; but before the time of taking food arrives, the stomach becomes irritated by its own secretion, which produces all the inconvenience of a foreign indigestible substance in that organ; such as a sense of sinking, of dragging, of nausea, faintness, gnawing, or erosion, which are again, for a time, relieved by the taking of food. (See art. PYROSIS.)

14. iii. OF CERTAIN SYMPTOMS OF INDIGESTION. — *A. Cardialgia*, or *Heartburn*, presents itself in two forms, each of which assumes various grades of severity. It is generally attended by *acid* or acrid eructations, exciting irritation in the throat and fauces. The acidity of the eructated matters is often remarkable, occasioning the most unpleasant sensations in the mouth and pharynx, with a copious flow of fluid from those parts. The matters brought up from the stomach are sometimes rancid and *alkaline*, particularly after a full meal of rich or fat animal food. In this case, a feeling of disgust is excited on each eructation, and large quantities are thus thrown off, or regurgitated from the stomach, without either nausea or retching. In either form, unpleasant gnawing, burning pain, and tenderness, are felt at the epigastrium, with distention, extending to the hypochondria, and with tightness or oppression in the chest. Cardialgia chiefly occurs during the period of digestion, but sometimes not until an advanced stage of the process. It may be mild, and consist simply of uneasy sensation, gnawing, or burning at the cardia, sometimes with slight faintness or flatulence; or it may be severe, the uneasiness extending over the region of the stomach, attended by depression, anxiety of countenance, and faintness. This latter state has been denominated *sinking heartburn*. It is only when cardialgia is severe, that it is accompanied with frequent and copious, rancid, alkaline or septic eructations.

15. *B. Of the Evacuations, &c.*—*a*. The *stools* furnish comparatively little information in dyspeptic ailments, when only those procured by an active purgative are examined. They are most commonly scanty, dry, and deficient in healthy odour and colour, especially in the asthenic and simple states of the complaint. In the irritative states, the discoloration is often greater, and they are occasionally mucous or watery, particularly when irritation extends along the alimentary canal. But in either variety, they vary remarkably in colour, consistence, and character; being either dry, pultaceous, slimy, scybalous, mucous, bilious, clayey, whitish, or yeasty, and sometimes presenting several of these appearances at the same time. The calls to evacuation are commonly rare or delayed, but they are occasionally frequent and inefficient. It is chiefly when torpid or disordered function of the liver, duodenum, or intestinal canal, is associated with indigestion, that the states of the evacuations described by Dr. W. PHILIP are met with; for these states, as Dr. J. JOHNSON justly contends, are not common in the simpler forms of the complaint. "The alvine discharge," the former writer remarks, "sometimes chiefly consists of bile; its colour at other times is too light, more frequently too dark, and occasionally almost black; at different times it assumes various hues, inclining to green or to blue; and sometimes it is mixed with, and now and then almost wholly consists of, undigested bits of food." When there is much straining, it often contains mucus, sometimes in distinct masses, or substances resembling bits of membrane. "It frequently separates from the canal with more difficulty then usual, and leaves a feeling of the bowels not having been completely emptied."

16. *b*. The *urine* of a person in good health is perfectly clear and limpid when passed, and continues so for some time after it cools, being more or less deep in colour, according as its ingredients are concentrated or diluted. But it has been satisfactorily shown, that when acidity is prevalent in the stomach and digestive canal, or when the usual acid secretion of the skin is impeded or suppressed, the urine, after standing for some time, deposits a reddish substance, which is found to be a coating of lithic acid, the supernatant fluid still remaining clear; but when an opposite condition to this exists in the digestive organs, the contents of the stomach being alkaline or devoid of their proper acidity, and when the function of the skin is unusually excited, the urine becomes turbid, and a whitish, or purulent white, sediment is observed, consisting of lithate of ammonia, or of an amorphous deposit of phosphates and lithates. If irritation or inflammatory affection of the stomach is present, this fluid is scanty and high-coloured. In irritability of the organ, it is often pale, limpid, and very copious. In several states of indigestion, it occasions smarting in its passage, owing to the unusual abundance of urea. Dr. PROUT observes, that in one or two cases of obstinate dyspepsia, he has seen the urine not only passed of a bright pink colour, but remain so on cooling, without depositing any sediment; and he considers this pink colour to proceed from the large quantity of purpurate of ammonia present, which, from there being no lithate of ammonia with which it might be combined, was necessarily held in solution.

17. *c. Pain and tenderness at the epigastrium* and region of the stomach have been much insisted upon by Dr. W. Philip, as indicative of the more inflammatory states of dyspepsia. But as I have shown elsewhere (see Stomach — *Morbid Sensibility of*), the most severe pains in this organ are often felt without any inflammatory disposition. Tenderness upon pressure is a very common symptom in the slight or more functional states of indigestion, as well as in the severe or more inflammatory, especially in thin and delicate persons. It is seldom wanting in irritative dyspepsia. The tenderness is often connected with *fulness* in this region, and also in the hypochondria. But this latter symptom is generally owing to the distention caused by flatus, and by feculent and flatulent collections in the colon. When emaciation takes place in protracted cases, the fulness becomes more apparent.

18. *d.* The *pulse*, in dyspepsia, is extremely various, but it is most commonly as I have described it. During the digestion of a full meal, it is usually accelerated, and somewhat harder or sharper than usual. The hardness insisted on by Dr. W. Philip, as indicative of the passage of functional into inflammatory dyspepsia, is seldom present. Sharpness and quickness are more frequently observed, and are symptoms of irritation rather than of inflammation. The febrile symptoms occasionally occurring, with soreness of the throat, high-coloured urine, and impaired secretions, are more probably occasioned by the former, than by the latter pathological state.

19. *C. Of the states of the associated viscera in dyspepsia.* — It is obvious that indigestion will vary in form and severity, with the concomitance of disorder in any of the other digestive organs. — The functions of the Duodenum may be deranged, as shown in that article; and, in this case, dyspepsia will present more or less of the characters there described (§ 2.). Other parts of the digestive canal may be deranged, the affection consisting either in impairment of function, or in nervous or vascular irritation, and being limited to the small intestines, or to the large bowels, or even to one only of the latter. (See arts. Cœcum and Colon.) In such cases, the physician will be guided by the state of the evacuations, and by the symptoms detected on a careful examination of the abdomen. — It is not improbable that the pancreatic secretion becomes disordered, particularly in protracted cases; but of this sufficient proofs are seldom furnished: at best it can be only a probable inference. That this secretion may be diminished is not unlikely, inasmuch as there is sufficient evidence of the *biliary secretion* being deficient, retained, and altered, especially in the chronic states of indigestion; and it is reasonable to infer, that, when one of the organs deriving influence from the same part of the nervous system is impaired in its functions, the other organs thus associated, as well as otherwise anatomically connected, will be similarly, if not coordinately, affected. Indeed, every experienced practitioner must have noticed a more or less remarkable deficiency, or other disorder of the bile in dyspepsia; and not only of it, but also of the other secretions poured into the intestinal canal. That the disorder originally induced in the stomach, often extends to the other digestive organs, owing to various concomitant or consecutive circumstances, cannot be doubted. It may be even apprehended, that the consecutive disorder will become the most serious in its nature and consequences, when these circumstances are frequent or continued in their operation; and that it will thereby obscure or mask the original affection. In many cases of dyspepsia, the functions of the biliary apparatus are impaired, in respect, not only of the quantity, but also of the qualities or properties of the secretion. In some, more or less of retention or obstruction of bile actually takes place, as shown by the state of the stools, rather than by the colour of the surface of the body. The remora of bile, also, in the biliary ducts and gall bladder, arising from impaired function of the stomach and torpor of the liver, will further increase the morbid state of the evacuations.

20. *D. Sympathetic affections of various organs.* — Whilst an immense number of diseases originate in neglected or protracted indigestion, various disorders are entirely sympathetic of it. Diseases of the urinary organs, of the liver and bowels, gout, rheumatism, various painful, neuralgic, and nervous affections, eruptions on the skin, disorders of the catamenia, and many others, often thus arise. Dr. Webster, in a treatise published in 1793, endeavoured to show this, before the appearance of the writings of Mr. Abernethy on the subject; but it had not been altogether neglected in the works of Whytt and others. This excellent author very justly remarks, that a delicate state of the first passages, or an unnatural sensibility of their nerves, not only disposes to many complaints in those parts, but the whole nervous system is thereby rendered more liable to be affected by the slightest causes. "Faintings, tremors, palpitations of the heart, convulsive motions, and great fearfulness, may be often owing more to the infirm state of the first passages, than to any fault either in the brain or heart. The powers which the alimentary canal, when its nerves are disagreeably affected, must have in producing disorders in the most distant parts of the body, cannot be doubted by those who attend to that wonderful and widely-extended sympathy, which obtains between it and almost the whole system."

21. *a.* The brain and organs of sense are often much affected by indigestion. *Headach* is one of the most common and severe affections, sympathetically excited by this complaint; but it has received sufficient consideration in the article on its different forms. The manifestations of *mind*, both intellectual and moral, are also often more or less disordered, although but slightly or imperceptibly. Memory is somewhat impaired; attention is unsteady and cannot be long continued; the disposition is more fickle, and the temper more irritable than natural. There are often confusion of thought, or of ideas, lowness of spirits, despondency, and vertigo, particularly in severe or protracted cases. M. Broussais has argued with much apparent justice, that the functional disorder, thus sympathetically induced in the brain, may, by its frequency or continuance, pass into organic change; and several recent writers in this country have adopted the opinion.

22. *b.* The *organs of sense* are not less liable to sympathetic disorder. — The *sight* becomes weak and indistinct; the eyes impatient of light or irritable; and specks or muscæ volitantes appear in the

axis of vision. — *Hearing* is frequently impaired, often from weakness of the nerves; but sometimes in consequence of the erythematic redness and inflammatory irritation, symptomatically produced in the throat, having extended along the Eustachian tube to the internal ear; or having caused obstruction of this canal. Noises in the ear are usually present in these cases; and these, as well as the hearing, depend much upon, and vary with, the state of the stomach. Care should be taken, however, not to impute affections of the head and of the senses, depending upon disease within the cranium, to disorder of the digestive organs. The disorders of these parts, arising from the stomach and other digestive viscera, disappear or are mitigated by wholesome food and drink, taken in moderate quantity; but when they proceed from the brain, they are aggravated, or at least, not mitigated, by the usual ingesta.

23. *c.* In the article FLATULENCE, I have shown the effect produced upon the actions of the *heart* by this, and other causes of distention of the digestive tube. Palpitations, and irregularity and intermissions of the pulse very often proceed from dyspepsia, particularly when the functions of the liver and of the intestinal canal are also disordered. In such cases, the morbid sounds of the heart are usually wanting, unless in some cases of severe palpitation, when a slight bellows sound is heard. The functional disorder, when frequent or protracted, may be followed by dilatation or some other organic change. When structural lesion already exists in this organ, the symptoms are much increased by indigestion, and by concomitant disorder of the liver. It should, however, be recollected, that lesions of the heart often occasion congestions of the liver and dyspeptic affections; and always aggravate them, where they already exist.

24. *d.* The influence of dyspeptic complaints in producing *affections of the lungs*, was contended for by Dr. W. PHILIP, doubted by Dr. PARIS, but admitted, in a limited sense, by Dr. J. JOHNSON, and some others. The choice Dr. PHILIP made of the term "*dyspeptic phthisis*," was certainly not fortunate, inasmuch as its meaning is equivocal. In protracted dyspepsia, and particularly when the liver becomes congested, or otherwise disordered, the respiratory organs often also are affected; the disorder of the digestive viscera both predisposing to affections of the respiratory passages, and occasionally more directly causing them. The irritation excited in the œsophagus, pharynx, and top of the larynx, by the affection of the stomach, is sometimes propagated along the air passages; and if, at the same time, the stomach is frequently distended and the liver congested, so as to impede the circulation through the lungs, disease of this latter probably will often be induced, especially if latent tubercles, or some other states of predisposition, exist. Besides, the debility caused by protracted disorder of the digestive organs often calls latent tubercles into activity, or rapidly developes them; and it may even be suspected that the impaired nutrition, consequent upon the debility and protracted disorder of the organs of supply, will sometimes even give rise to tubercular productions, where they did not previously exist even in a rudimental state.

26. iv. THE CONSEQUENCES AND TERMINATIONS OF INDIGESTION have been partially alluded to (§ 19, 20.); but they require a more particular notice. (*a*) Dyspepsia may terminate in a restoration of the healthy function of digestion; — (*b*) It may pass into more severe functional or structural disease of the stomach; — (*c*) It may superinduce disease of the liver, bowels, and other collatitious organs; — (*d*) It may give rise to affections of remote organs or parts; — (*e*) and lastly, it may alter the constitution of the circulating fluids, originate diseased secretions and depositions, and generate a morbid diathesis of the system, occasioning several serious consitutional maladies. These consequences will, however, depend much on the exciting causes, the predisposition, the temperament, the habit of body, and other circumstances proper to the person affected.

27. *a.* A termination in restoration of healthy digestion seldom takes place, or if it take place, it is rarely permanent, unless the predisposing and exciting causes are avoided. Many of those causes originate in those propensities, desires, and passions, which are controlled with the greatest difficulty; and several of them depend upon habits, which require the utmost force of character to relinquish. Hence the want of success so often experienced in the treatment of dyspeptic complaints, and the dissatisfaction evinced by those who run from one physician to another, unreasonably expecting immediate or permanent relief, still desiring to indulge the senses — to gratify the propensities and desires, natural or acquired, without paying the penalties thereby incurred. Hence, also, the frequency of the serious consequences of severe or neglected dyspepsia about to be noticed.

28. *b.* The forms of indigestion already described, from neglect or the continuance of their causes, may pass into the more severe affections of the stomach. In some instances, the most violent *gastrodynia* or gastralgia supervenes on them. (See STOMACH—*Painful Affections of*.) In others, PYROSIS follows the form of irritative dyspepsia attended by the rejection of a glairy fluid, (§ 13.) and seems to be an extreme condition of the same complaint with modifications depending upon peculiarities of constitution and of functional lesion. In some cases, VOMITING (see that article) of a severer or more prolonged character than that occasionally taking place in dyspepsia, occurs, even independently, although more frequently in consequence, of structural change of either the stomach or some other organ. In the latter case, the source of mischief may be in the liver, or in the brain, or even in the kidneys, or uterus. More rarely neglected cardialgia or other dyspeptic states pass into partial or complete RUMINATION, (see that article), particularly when the meals are taken hurriedly, in large quantity, and insufficiently masticated (see AUTHOR, in *Lond. Med. and Phys. Journ.* for May, 1821, p. 362.). Neglected dyspepsia is very frequently followed by inflammatory action, and its consequences in the villous coat of the stomach (see STOMACH —*Inflammation and Organic Lesion of*). This result, I am convinced would more frequently take place, and when it did occur, would lead to still more serious effects, but for the circumstance of the secretions from the villous coat favouring resolution by unloading the capillary vessels, and for the want of appetite and nausea attending inflammatory action, preventing the ingestion of substances calculated to keep up the morbid action.

28. *c.* The supervention of disease, functional or structural, in collatitious viscera, in the course even of the more simple and slight forms of indigestion, is so common, that the attention should never be withdrawn from it in practice. There are few cases of dyspepsia, in which the functions of the Liver and Duodenum (see those articles) are not more or less disturbed. The *liver* becomes torpid and congested, and sometimes more or less tumid, from either congestion in its vessels, or accumulations of bile in the ducts; this secretion being often inspissated from absorption, during its remora, of its more watery part. It then either obstructs, irritates, or otherwise disorders the canals along which it passes (see art. Gall Bladder and Ducts), and affects even the substance of the liver itself, which ultimately becomes inflamed, and gradually and variously changed. In protracted or severe cases of indigestion, other organs also become disordered, especially the bowels; *constipation*, *colic*, or *diarrhœa*, in some one or other of their forms, frequently occurring, particularly when irritation of the digestive mucous surface is induced, and when the secretions, poured into the intestines, are deranged.

29. *d.* Affections of remote organs, sympathetically produced by dyspepsia, have been already noticed (§ 20.), but there are others which arise from this complaint, rather by a succession of morbid changes, than by any sympathy or consent of parts. When protracted or severe indigestion gives rise to an imperfectly elaborated chyle; or when the impaired organic nervous energy, which is chiefly manifested in the functions of the stomach in dyspepsia, extends also to the circulating, assimilating, and excreting organs; affections of the kidneys, and urinary bladder, in connection with a morbid state of the urinary secretion, frequently take place. Hence the formation of sabulous matter or gravel in the urine, and of calculi in the kidneys and bladder; and even the production of diabetes, and of slighter disorders of the excretion of urine. In females, dyspepsia not unfrequently occasions difficult, too frequent, or delayed or irregular menstruation, hysteria, and painful affections of the spinal nerves in some portions or other of their distribution, with tenderness in the dorsal spine. In both sexes, cutaneous eruptions either originate in, or are perpetuated by, dyspeptic disorders, and by the state of the circulating fluids, and of the cutaneous exhalation consequent upon them. A due recognition and estimation of these connections of disorder are of the utmost importance in practice.

30. *e.* There is every reason to infer, that the pathological conditions, of which dyspepsia is an early and important indication, by altering the functions of assimilation and secretion, and weakening the processes of depuration, may give rise to a state of the circulation, productive of painful affections, or of unnatural formations and depositions in weak or predisposed parts; or in other words, to a truly morbid diathesis, or constitutional derangement. Hence the frequency of rheumatism, of neuralgic or painful affections, of urinary calculi and gravel, and especially of gout, after protracted or severe indigestion.

31. II. Causes.—*A. Predisposing.*—Indigestion, although not confined to any period of life, occurs most commonly between the ages of twenty and forty-five; and in *its simple form* more frequently in the female, than in the male sex. The upper classes of society and the middle ranks of life are most subject to this variety of the complaint. It is more prevalent in cold and temperate, than in warm climates, and in the winter than in the summer; but whatever may be the temperature of the climate or of the season, damp weather, and a moist atmosphere, may be regarded as among its most active predisposing causes. The predisposition to this disorder is sometimes hereditary, particularly in persons of a weak relaxed fibre, with high nervous susceptibility, and general debility of constitution. Those in whom the functions of the stomach are naturally weak and feebly performed, the circulation languid, the temperature of the extremities below the natural standard, and the secretions generally disordered, or more abundant than usual, are also constitutionally predisposed to dyspepsia. Sedentary occupations, especially when carried on in close rooms and factories, indolent habits either of body or mind, long and intense study, insufficient exercise in the open air, addiction to debilitating excesses and injurious indulgences, luxurious modes of living, indulgence in sleep or in bed, breathing impure air and confinement to close or ill-ventilated apartments, remarkably predispose to this complaint. In persons thus predisposed, the slightest excess or irregularity, or the most trivial exciting cause, is often sufficient to bring on an attack of indigestion; whilst a repetition of such causes, or long exposure to their action, in those of a stronger habit and more vigorous constitution, cannot fail to have a similar effect.

32. *B. The exciting causes* are divisible into two classes: — (*a*) Those which operate immediately or directly upon the stomach itself; and (*b*) Those which influence this organ through the medium of other parts. — (*a*) The causes, which affect the stomach itself, act either by diminishing or otherwise vitiating its secretions, so that the due change is no longer effected in the food; or by debilitating its muscular power, so that the aliment, although it may have been properly acted upon by the gastric juice, is not propelled into the duodenum with the natural ease and rapidity. As the admixture of the food with the gastric juice, and the passage of the chyme into the duodenum can only be accomplished by the due contraction of the muscular fibres of the stomach, it is evident that, whatever tends to weaken or to impede this action, will at once be followed by oppression or distention of the organ. In this class of agents may be included narcotics, taken habitually or in excess, as opium, henbane, conium, digitalis, &c., indulgence in ardent spirits, or intoxicating liquors, and the constant or frequent use of the preparations of ammonia, of lavender, and of other aromatic spirits. But the most common causes of indigestion are, irregularity and want of due caution in diet, whether as regards the quantity, or the quality and congruity of the food, or the periods at which it is taken, and the use of tobacco in any of the modes in which this noxious substance is so generally employed.

33. A want of due relation between the state and powers of the digestive organs, and the substances upon which they are required to exercise their functions, is a very frequent cause of this complaint; for whether the stomach be distended by

an unusual quantity of food; or whether its secretion be compelled to act upon substances which are inappropriate, or to which it is unaccustomed, the function of the organ will be equally impeded; and if the exciting cause be powerful, or continue in operation, digestion will be altogether suspended. Hard and indigestible articles of food must therefore be productive of this disorder; and hence its frequency among the peasantry and lower orders. Heating and highly-seasoned articles of food, hot dishes, and condiments, mushrooms, shell-fish, melons, cucumbers, nuts, and similar substances; raw, stale, or unripe fruit; rich articles of confectionary; acid, iced, or sweet fluids, especially when taken during the process of digestion; large quantities of cold or of warm fluids, as of tea, relaxing slops, &c.; and the habitual use of malt liquor, are among the most common causes of indigestion. The kind of aliment also exerts no small influence, even in mechanically distending, and thereby weakening the stomach; for as most of the articles of food, when received into the organ, seem to swell in a greater or less degree, a bulky meal, particularly of solid or pultaceous or vegetable substances, will not a little contribute to this effect. To the above causes may be added, irregularity in the period between the times of taking food, hasty or imperfect mastication, frequent interruption or talking during the progress of eating, the omission of an accustomed meal, abstinence or long fasting,—hence its frequent occurrence during the fasts of the Catholic church, and among the Brahmins, Fakirs, &c., in India,—a sudden change in diet from animal to vegetable food, and from substances of a succulent and refreshing, to those of a dry and heating nature, and severe and repeated vomiting. All these tend, in a greater or less degree, to debilitate the muscular fibres of the stomach; to produce a deficiency of gastric secretion, or a secretion vitiated in its properties; and to irritate the villous coat of the organ.

34. *b.* Amongst those causes which operate on the stomach through the medium of other parts, may be classed those mental emotions, which depress nervous power, or otherwise disorder its manifestations. A due secretion of the gastric fluid depends much on the state of nervous influence; for a deficiency of the latter impedes or lessens the former. Any sudden intelligence, a violent fit of passion, or of great joy, sometimes instantly brings on an attack of indigestion. Grief, anxiety, envy, jealousy, indulgence in tender feelings, repeated disappointment, reverses of fortune, night watching, &c., more slowly, but more certainly, exert a similar influence. Whatever exhausts the body and lowers the constitutional powers, exerts a correlative effect on the digestive functions, as venesections improperly adopted, or soon after a meal; protracted hæmorrhages; menorrhagia; leucorrhea; venereal excesses; seminal weakness; and exhausting discharges of any kind. In persons particularly of a weak and delicate constitution, indigestion is easily induced by change of weather, by exposure to the night air or to cold and humidity, by cold extremities, by a low temperature when the body is quiescent, as when travelling in an open carriage or on the outside of stages, by a fatiguing journey, by damp residences, and similar circumstances. Whatever exerts a depressing effect on the organic nervous power, or on any of the internal viscera, will also lower the function of the stomach, as large doses of calomel, or too long a continuance of this medicine, irritating and drastic purgatives, &c. Dyspepsia may be brought on, also, by the suppression of the natural and the accustomed discharges, or by the retropulsion of cutaneous eruptions, &c. It also not unfrequently accompanies catarrhs, rheumatism, and diseases of the thoracic viscera; it is a necessary consequence of disorder of any other of the abdominal organs; and it precedes and attends the various states of gout, &c.

35. *C. The irritative states of dyspepsia* are more frequently met with in the male than in the female sex, and are very prevalent in the southern countries of Europe, and amongst Europeans resident in tropical regions. They are common in those warm climates in which the air is dry, and the temperature subject to frequent and sudden variations; but the causes acting directly on the stomach are often frequent and influential in those countries. In warm climates, the modes of living — the diet and regimen of Europeans are extremely prejudicial to the digestive functions, as shown by Mr. Annesley, and the Author. (*Researches on the Diseases of India and of Warm Climates, generally, &c.*, 4to. vol. i. p. 226.) The quantity and nature of the food and drink usually taken excite and irritate the stomach, liver, and intestinal canal, and exhaust their functions; the states of indigestion thus induced soon passing into inflammation, or into organic changes, if neglected or injudiciously treated.

36. The irritative states of dyspepsia are, however, by no means uncommon in this country, in hot seasons, and even in very cold weather, and during the prevalence of severe or long continued frosts, accompanied by north-easterly winds. They affect chiefly persons of a sanguine and bilious temperament, and of plethoric habit; and in them, especially, are sometimes produced by checked perspiration, by the suppression of accustomed discharges, as of hæmorrhoids, of leucorrhea, of the catamenia, &c., by the drying up of ulcers, and by the repulsion of cutaneous eruptions. They are, however, more commonly occasioned by the abuse of stimulants, as highly-seasoned and rich food, and by addiction to spirituous and intoxicating liquors, and to opium. These states of indigestion are not so often consequent upon errors in diet, as the other forms of the complaint; but they are most frequently met with in the habitual drunkard. They may be induced by change of diet, or change of residence, or climate, and hence their greater prevalence during spring and autumn; by stimulating medicines, as a long continuance of the use of cubebs and copaiba for gonorrhea; by drastic and irritating purgatives; by powerful or repeated emetics; by tonic, stomachic, and aromatic spirits or tinctures, taken in too large doses, or on improper occasions; by hot spices and pickles, particularly cayenne pepper, capsicums, &c.; by the frequent use of mercurial and of heating medicines; by drinking cold and acid fluids after violent exercise, or whilst the body is perspiring; and by various noxious articles, used either as food or drink, or which give rise to incongruous mixtures in the stomach.

37. III. Pathology. — Indigestion manifestly proceeds from the following *conditions* of the sto-

mach and related organs, either of which may be somewhat more prominent than the rest: — 1. Impaired organic nervous power of the stomach. 2. A deficient or disordered state of the gastric juice, or a want of a due relation between the quantity and nature of this fluid and the ingesta. 3. Impaired absorbing power of the stomach, rendering the digestion of the fluid ingesta more or less difficult, and weakening the gastric fluid. 4. Diminished muscular energy of the stomach; the motions and tonic vermicular actions of the organ being weakened, and the admixture of the gastric juice with the ingesta being thereby impeded or delayed.* These pathological conditions may be *primary*, or they may be *consecutive* upon disease of the brain, of

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* As Dr. COMBE observes, the *first* requisite to digestion is an adequate supply of gastric juice, and its thorough admixture with every particle of the food on which it is to operate. The *second* is a steady temperature of about 98° or 100° Fahr. The *third* is the gentle and continued agitation of the alimentary mass in the stomach during the digestive process. — Much light has been thrown upon the function of digestion, and consequently upon disorders of this function, by the experiments of Dr. BEAUMONT, of America, on ST. MARTIN, a strong young Canadian, who was wounded in the left side, a fistulous opening into the stomach remaining without detriment to the general health. For some months after the wound, the food could be retained only by wearing a compress and bandage; but early in winter, a small fold or doubling of the villous coat began to appear, which gradually increased till it filled the aperture and acted as a *valve*, so as completely to prevent any efflux from within, but to admit of being easily pushed back by the finger from without.

Dr. BEAUMONT describes the aperture in ST. MARTIN's stomach as being situated about three inches to the left of the cardia, near the left or superior termination of the great curvature. When the stomach was nearly empty, he was able to examine its cavity, to the depth of five or six inches by artificial distention. When it was entirely empty, the stomach was always contracted on itself, and the valve generally forced through the orifice, together with a portion of the mucous membrane, equal in bulk to a hen's egg. After sleeping for a few hours on the left side, the protruded portion became so much larger, as to spread over the neigbouring integuments five or six inches in circumference, fairly exhibiting the natural rugæ, villous membrane, and mucous coat, lining the gastric cavity. This appearance was almost invariably exhibited in the morning before rising in bed.

The first point which Dr. BEAUMONT conclusively settled is, that the gastric juice does not continue to be secreted between the intervals of digestion, and does not accumulate, to be ready for acting upon the next meal. The next which he established is that in health, the gastric secretion always bears a direct relation to the quantity of aliment naturally required by the system; so that if more than this be taken, there will be too small a supply of the juice for the digestion of the whole. Dr. BEAUMONT further ascertained that the gastric secretion, and the villous coat, undergo great changes during disease. In the course of his attendance on ST. MARTIN, he had opportunities of *seeing* what was actually going on in the organ, and of observing, that whenever a feverish state was induced by obstructed perspiration, or by stimulating liquors, or by overloading the stomach; and that when influenced by fear, anger, or other emotions, depressing or disturbing the nervous system, the villous coat became sometimes red and dry, and at others, pale and moist, having lost its smooth and healthy appearance. As a necessary consequence, the secretions became vitiated, impaired, or suppressed; and the follicles, secreting the mucus which protects the surface of the villous coat, became flaccid, and no longer yielded this bland secretion. The nervous and vascular papillæ thus deprived of their defensive shield were then subjected to undue irritation. When these diseased appearances were considerable, the system sympathised, and dryness of the mouth, thirst, quickened pulse, &c., showed themselves; and no gastric juice could be procured or extracted, even on the application of the usual stimulus of food. The dry, irritated appearance of the villous coat, and the absence of the healthy gastric secretion in the febrile state, as Dr. COMBE has remarked, not only explain at once the want of appetite, nausea, and uneasiness generally felt in the region of the stomach; but also show the folly of attempting to sustain strength, by forcing the patient to eat, when the food cannot be digested, and when nature instinctively refuses to receive it.

The inferences, drawn from the experiments and observations of Dr. BEAUMONT and others, that more immediately concern the subject under consideration, may be stated as follows: —

1. That the processes of *mastication, insalivation* and *deglutition* are important, not merely as subjecting the food to the gastric juice in a state of due preparation for its action, but also as allowing time for the regular contraction of the stomach upon each individual morsel conveyed into it, as well as transmitting the food in small portions at a time, so as to prevent a too rapid or excessive, and injurious distention of the organ. —

2. That the gastric juice is the agent of chymifaction; that it is secreted from vessels distinct from the mucous follicles; that it is a clear transparent fluid, without odour, a little salt, and perceptibly acid; and that it contains free hydrochloric acid, a little acetic acid, and some other active chemical principles. —

3. That this juice is never found free in the stomach, but is always excited to discharge itself by food or other irritants; that it is seldom obtained pure, but generally mixed with mucus, and sometimes with saliva; and that, when pure, it is capable of being kept for months, or even years. —

4. That it is a solvent of food, and alters its properties; that it checks the progress of putrefaction, corrects putrid substances, coagulates albumen and milk, and afterwards dissolves the coagula; and that it commences its action on food as soon as it comes in contact with it. —

5. That it is capable of combining with a certain fixed *quantity* of food; and when more is presented for its action than it will dissolve, indigestion will ensue; and that its action is facilitated by the warmth and motions of the stomach, these motions taking place chiefly in two directions, transversely and longitudinally. —

6. That the gastric juice is modified in quantity, and probably in its intimate constitution, so as to suit the kind of food; and hence the occurrence of indigestion on sudden alterations of the kinds, quality, and quantity of food.

7. That the action of the stomach and of its fluids is the same on all kinds of diet: and that the motions of the stomach produce a constant admixture of food and gastric juice, and thereby facilitate digestion. —

8. That *solid* food, of a certain texture, is easier of digestion than *fluid*; that *animal* and *farinaceous* aliments are more digestable than *vegetable*; but that susceptibility of digestion does not depend altogether upon natural or chemical distinctions. —

9. That digestion is facilitated by *minuteness of division* and *tenderness of fibre*, and retarded by opposite qualities. —

10. That the ultimate principles of aliment are always the same, from whatever food they may be obtained. —

11. That chyme is homogeneous, but variable in its colour and consistence; and that, towards the latter stages of chymification, it becomes more acid and stimulating, and passes more rapidly from the stomach. —

12. That soups and other liquid food do not call into play the muscular coat of the stomach; and before the gastric juice can act upon them, the fluid part must be absorbed and the mass thickened to a proper consistence for undergoing the usual churning motion; and, consequently that this kind of food often gives rise to acidity, particularly in weak states of the stomach. —

13. That, owing to the adaptation of the gastric juice to the nature of the food, sudden or extreme changes from one kind of diet to another is injurious; for the stomach has not had time to modify its secretions sufficiently to meet the altered demand upon its powers. —

14. That water, ardent spirits, and most other fluids, are not affected by the gastric juice, but pass from the stomach soon after they have been received; that heating condiments are injurious to the healthy stomach; and that the use of spirits always causes disease of this organ, if persevered in. —

15. That bulk, as well as nutriment, is necessary to articles of diet; and that digestibility does not depend upon the quantity of nutrient principles that aliments contain. —

16. That the quantity of food generally taken is more than the wants of the system require; and that such excess, if persevered in, generally produces functional disorder, and consecutively, organic disease. —

17. That oily food is difficult of digestion, though it contains a large proportion of nutrient principles.

18. That *bile* is not usually found in the stomach, and is not necessary for the digestion of food; but that, when oily food is used, it assists digestion. —

19. That gentle exercise facilitates digestion; and that the *acetic, citric*, and *hydrochloric* acids promote this process, particularly if vegetables and indigestible substances have been taken. —

20. That the time required for the stomachic digestion

the liver, of the intestines, of the heart, of the kidneys, or of any other organ; or they may be part only of some more general malady. Dyspepsia may thus be *idiopathic* or *symptomatic*. As presented to the physician in practice, indigestion is generally owing to the above conditions, in connection with the following: — 1. Deficiency, as to quality and quantity, of the fluids derived from the liver, pancreas, and intestinal mucous membrane. 2. Disorder of the circulation and functions of this membrane; and 3. Disorder of the consecutive and harmonious actions of the muscular coat of the small and large intestines.

38. IV. Treatment. — There are few diseases which require greater attention to its causes, and to its various states during the treatment, than this. The *objects* of the practitioner are: — 1. To ascertain the predisposing and exciting causes; 2. To draw a rational inference as to the pathological states on which the complaint depends; and 3. To examine into its associations, and to attend to the nature and relation of its complications, whether primary or consecutive. Guided by these *general intentions*, the more *special indications* are: — 1. To avoid the causes; 2. To give immediate relief to the more urgent symptoms, as acidity, cardialgia, flatulence, pain, costiveness, &c.; 3. To remove the pathological states and their consequences; and 4. To prevent a return of the disorder. These indications require to be fulfilled by means appropriate to the particular form of the complaint.

39. i. *Treatment of the Asthenic Form of Dyspepsia. A. In the more acute states*, it is sometimes necessary to remove the load by which the stomach is oppressed, or the substance by which it is irritated, by an *emetic*. But, unless when it is obvious that the disorder depends upon this cause, emetics are injurious, particularly a repetition of them. In such circumstances, the effect is soon produced by irritating the fauces by a feather, or with the finger; by a warm infusion of chamomile flowers; by tepid water, with common salt, or with an aperient salt, and by ipecacuanha. When pallor of the countenance, nausea, oppression, and the sense of a load at the epigastrium, and rancid or bitter eructations are present, emetics are indicated; and these are the most suitable means. But after the organ is evacuated, its functions should be restored by repose, and by small quantities of seltzer water, of iced water, or a cooling aromatic water, as spearmint, &c. Food should not be given till the appetite returns, when the lighter and more palatable articles may be taken. The bowels afterwards require to be evacuated, either by stomachic aperients, as rhubarb, with magnesia or soda, in an aromatic water, or aloes with an alkali, as in the compound decoction, or by enemata. Most of the means recommended in the article Constipation (§ 15. *et seq.*), and in several of the Formulæ of the *Appendix*, will likewise be appropriate in these circumstances.

40. When *nausea* continues after the stomach and bowels have been evacuated, or when the *vomiting* is protracted after offending matters are removed, medicines to relieve these symptoms should be prescribed, especially the *hydrocyanic acid*, in camphor julep, with a little compound spirit of lavender, or tincture of cardamoms, or a drop or two of *kreosote*, in the form of a pill, with powdered liquorice root. Effervescing draughts, with citric acid and ammonia, this last being somewhat in excess; or the liquor ammoniæ acetatis, with camphor mixture, or with spearmint water; or calcined magnesia, in this or in any other aromatic water, will also be serviceable. If these fail of affording relief, active purgative enemata will generally be efficacious, the symptoms disappearing as soon as a free action of the bowels is procured.

41. *Heartburn* is best treated by medicines, which act upon the secretions, and move the bowels. Rhubarb, with magnesia, and sesqui-carbonate of ammonia, in an aromatic water; blue pill, with castile soap; and alkaline solutions in bitter tonic infusions, or in lime water, are commonly employed, and are most useful when this symptom is connected with acidity. But when heartburn is attended by rancid, septic, or insipid eructations, the mineral acids, as the nitric, the hydrochloric, and the aromatic sulphuric acids, given in simple camphor, or aromatic water, or in suitable tonic infusions, will be most serviceable. Dr. Pemberton advises lemon-juice in these cases, and Dr. Todd, the phosphoric acid. When there is a liability to heartburn, wine, spirits, and particularly malt liquors, should be avoided. Hock or old sherry may, however, be taken in great moderation, in seltzer water.

42. *Pain*, or the slighter states of morbid sensibility, will be best removed by the *trisnitrate of bismuth*, conjoined with extract of *hop*, or extract of *hyoscyamus*; by *hydrocyanic acid* or *kreosote*, as directed above (§. 40.); by other anodynes, given with aromatics and antispasmodics; by the compound or fœtid spirit of ammonia, in suitable vehicles; by the compound galbanum pill, or the compound rhubarb pill, with henbane and ipecacuanha; by draughts of warm water, either alone, or with an alkali, or with magnesia. If pain be severe, and if *vomiting* have come on spontaneously, and continued after morbid matters are removed, a full dose of *opium*, with an aromatic, or of the acetate or hydrochlorate of morphia, similarly combined, should be prescribed. But the propriety and frequency of repeating it will depend upon the circumstances of the case. If *fla-*

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depends upon the quantity and kind of food, and upon the state of the stomach; that the time required for the disposal of a moderate meal, in a healthy state of the organ, varies from three hours to three hours and a half or four hours; and that in states of indigestion, the process is delayed much longer than this, particularly as respects the more indigestible substances. —

21. That a diminution of the temperature of the stomach below 98° impedes digestion: and that the temperature of the organ is not necessarily elevated by the process. —

22. That whatever promotes organic nervous power, without exhausting it, favours digestion, as breathing a dry pure air, hilarity of mind, moderate laughter, &c. —

23. That the organic or ganglial nervous influence is more concerned in the process of digestion, than the influence conveyed to the stomach by the eighth pair of nerves; and that the circulating, absorbing, and especially the secreting functions of the organ are under the dominion of the former, whilst the sensibility and muscular contractions are directed by the latter. —

24. That the inference drawn by Dr. W. Philip from his experiments, as to digestion depending upon the influence of the eighth pair of nerves, and as to galvanism being capable of supplying the place of this influence, are unphilosophical, as they are formed without due consideration of all the circumstances, and as they leave out of the account the shock given to the system by the violent operations performed in these experiments.

tulence is troublesome, the means already advised may be prescribed, or those recommended in that article (§ 15.) may be employed. Friction over the epigastrium, especially with a stimulating liniment, will also give immediate relief from both pain and flatulence. When *headach* is present, the treatment proposed for *Dyspeptic* Headach (§ 46.) should be directed. For the *costiveness* so generally attendant upon this form of indigestion, the medicines already noticed, or those about to be prescribed, or a combination of mild aperients with tonics, deobstruents and alteratives being given occasionally at night, will prove of great service.

43. After an acute attack of dyspepsia, particularly when occasioned by errors of diet, it is necessary to enjoin abstinence, and thus afford the stomach time for repose, until its organic sensibility and functions begin to return. After a while, a cup-full of mutton or veal broth, or of green tea, or of coffee without milk, may be given and repeated; or a wine-glass full of port-wine negus may, in some cases, be allowed. But care should be taken in returning to a full diet; and the injunctions as to diet about to be stated ought to receive attention. In general, tonics and stomachics should not be prescribed until the functions of the stomach are returning.

44. *B.* Having removed the more acute attack of asthenic dyspepsia, with its urgent symptoms, the remaining disorder is in all respects the same as the more *slight and chronic states of the complaint*, and requires a similar treatment to them. The *third intention* of cure (§ 38.) should now be carried into effect; and the organic nervous energy, the secretions, and the muscular tone of the stomach be improved. This intention is to be effected chiefly by the *diet* and *regimen* hereafter to be noticed; but a judicious recourse to medicine will also prove of great benefit. The infusion of cinchona, of columba, of gentian, chamomile, cusparia, cascarilla, will be severally useful, with the alkaline carbonates, and small doses of stomachic tinctures. Afterwards the metallic tonics, as the tincture of the sesquichloride of iron, the sulphate of iron, the sulphate of zinc, the trisnitrate of bismuth, and the mineral acids, will generally be of service. Several of these may be given with the extract or tincture of hop, or of hyoscyamus. Lime water may be taken with aromatics, particularly when the bowels are much relaxed; and the aërated, or alkaline chalybeate waters may be used. When there is no complication contra-indicating cold bathing or the shower bath, it will be advantageous to resort to them frequently; and when uneasiness at the epigastrium is often felt, a warm plaster will be worn in this situation with benefit.

45. The most active or varied means employed to restore the functions of the stomach will be frequently inefficacious, if the offices of the collatitious viscera be imperfectly performed. The *biliary secretion* should therefore be promoted or corrected by occasional doses of blue pill, or Plummer's pill with soap: and the bowels preserved moderately open by mild purgatives, or by a combination of them with bitters and tonics. With this view, rhubarb may be conjoined with aloes, guaiacum, and ipecacuanha, or with magnesia; the infusion of senna, with the infusion of gentian; the compound decoction of aloes, with the decoction or extract of taraxacum; the sulphate of potash with rhubarb; the purified extract of aloes with castile soap, &c. — These and other mild purgatives may be taken in other combinations, as draughts, mixtures, or pills, as prescribed in numerous and various forms in the *Appendix*, and in the article Constipation. A judicious combination of bitters with mild purgatives, as, of sulphate of quinine, or inspissated oxgall with aloes (F. 562. 575.); the infusion of senna with any of the bitter infusions (F. 266.); and the decoction of aloes, with soda and infusion of columba, will generally be extremely useful in this state of the complaint.

46. When chronic asthenic dyspepsia is attended, not only by a torpid state of the liver, but also by incipient cachexia, or has given rise to cutaneous eruptions, &c., much benefit will result from the simple preparations of sarza, with liquor potassæ or Brandish's alkaline solution, and extract of taraxacum. If it have occasioned difficult or impaired menstruation, or a state of incipient chlorosis, as often observed in females in London, the preparations of iron, particularly the mistura ferri composita, the decoction of aloes being taken so as to act freely on the bowels; or the pilula ferri composita, conjoined either with the pil. aloes cum myrrha, or the pil. aloes composita; will generally remove all disorder, if sufficiently persisted in, and aided by change of air, diet, and exercise.

47. In this form of dyspepsia, the restoration of the digestive functions much depends upon a healthy state of the other excreting organs, as well as of the bowels. The functions of the kidneys and of the skin should be duly promoted and corrected. The temperature of the general surface, and the exhalations from it, ought to be preserved, and the urine duly examined, in order to ascertain, not only its appearance, but the general character of its chemical constituents. As these vary, or, as certain of them predominate, so should some of the most efficacious medicines, prescribed in the complaint, be varied or altogether changed; so should tonics be conjoined with alkalies or acids; and aperients and alteratives be given with absorbents or deobstruents.

48. ii. *The irritative variety of dyspepsia* requires very different means of cure from those just advised; but the removal of the exciting causes is as necessary in the treatment of it as in that of the foregoing. — *a.* In the more *acute states* of this variety, when pain, tenderness, heat, or soreness is felt in the epigastrium, although the vascular disorder of the villous surface may not amount, it nearly approaches to inflammation; and erethism, or vascular congestion, at least, exists. The application of *leeches* to the epigastrium then becomes necessary. In plethoric persons, a *bleeding* from the arm should be preferred. In those who have suffered from hœmorrhoids, or obstructions of the liver, *cupping* on the hypochondria, and in females, whose catamenia are deficient, leeches to the groins may be prescribed. Afterwards a large rubefacient plaster, formed either of equal parts of the compound pitch and ammoniacal plasters, or of seven parts of the former with one of the cantharides plaster, should be applied over the epigastrium. The blue pill, or hydrarg. cum cretâ should be taken at bed-time, and a mild aperient in the morning. Fresh castor oil,

assisted by cathartic enemata, will be useful in this variety. In some of the more acute cases, a full dose of calomel, either alone, or with a little James's powder, will be of service. Although calomel, when frequently exhibited, weakens the nervous energy, yet an occasional dose diminishes vascular action in the villous coat of the stomach, and excites the actions of the lower bowels. It should be followed by mild purgatives and active enemata; for by increasing the organic actions of the lower portion, the morbid states of the upper parts of the digestive tube, will the more readily subside. When this variety of dyspepsia is attended by an erythematic *redness*, or *soreness of the fauces and pharynx*, as it frequently is, sometimes extending down along the œsophagus, calomel, taken in the form of powder, aided by mild aperients and active enemata, will be of essential service, not only in acting in the manner just stated, but also in promoting the secretions of the liver and intestinal canal.

49. The other *urgent symptoms*, noticed with reference to the former variety, are generally much more severe in this, and require a somewhat modified treatment. But irritation, erethism, congestion, or even inflammatory action of the villous coat, are not the only pathological states characterising cases of this kind. Organic nervous power, the secretion of the gastric juices, and the tone of the coats of the stomach, are more or less weakened or disordered, and require to be strengthened, as well as corrected. At first, cooling medicines and diaphoretics are required, in order to remove irritation or vascular excitement; but they should afterwards be conjoined with mild tonics or gentle restoratives, and aided by a light farinaceous diet (§ 72.). If *nausea* or *vomiting* occur in this variety, the means already prescribed (§ 40, 41.) will generally remove them.— If they proceed from irritating ingesta, the gentle measures noticed above (§ 39.) will procure their expulsion. Afterwards small doses of the nitrate of potash, and of the solution of the acetate of ammonia, may be taken in camphor water.— When this variety is caused by intemperance, these medicines, aided by abstinence, will prove particularly serviceable. If pain or internal heat is complained of, or if vomiting continues after offending matters are removed, or after vascular depletion has been practised, the warm turpentine epithem, or a mustard poultice, may be applied over the region of the stomach, or one of the liniments above referred to, may be used as an embrocation in the same situation. The anodynes advised for the asthenic variety may also be taken, and cathartic enemata administered, until the bowels are freely evacuated. The medicines already recommended for *heartburn*, and for other unpleasant symptoms, will also be appropriate, after having had recourse to the means just advised.

50. *b.* In the *chronic states* of irritative dyspepsia, local depletions are requisite, only when there is evidence of plethora, or of increased action, or when natural secretions or accustomed evacuations are suppressed. Small doses of mild mercurials at bedtime, the simple preparations of sarza, either alone or with liquor potassæ, and external derivatives, are here extremely beneficial. After the secretions have been improved by these, and the excreting functions restored, the milder tonics conjoined with refrigerants and diaphoretics or anodynes, will be of great service. The decoction of Iceland moss and various other demulcents may be taken with hydrocyanic acid; and a plaster, consisting of either the ammoniacal, the compound pitch, or the compound galbanum plaster, may be worn on the epigastrium. I have generally preferred a plaster, consisting of equal parts of the compound pitch, and of the ammoniaco-mercurial plasters, and prescribed the following: —

No. 262. ℞ Potassæ Nitratis ʒ ss.; Liquor. Ammoniæ Acetatis ℥ i.; Infusi vel Decocti Cinchonæ ℥ iii.; M. Capiat Coch. ii. vel. iii. larga bis terve in die.

No. 263. ℞ Potassæ Nitratis ℈ i.; Liquoris Ammoniæ Acetatis ℥ i.; Aquæ Flor. et Infusi. Aurantii Comp. āā ℥ iiss.; Misce. Capiat tertiam partem, ter in die.

No. 264. ℞ Acidi Hydrocyanici, M. ii. Mist. Amygdalæ Dulcis; Aquæ Flor. Aurantii, et Mistur. Camphor. āā ℥ ss.; M. Fiat Haustus ter in die sumendus.

No. 265. ℞ Infusi Lupuli, ℥ ivss.; Acidi Hydrocyanici, M. viii.; Tinct. Aurantii et Tinct. Gentianæ comp., āā ʒ ii.; M. Capiat quartam partem bis terve in die.

No. 266. ℞ Liquoris Potassæ, ʒ iss.; Decocti Sarzæ. ℥ vii.; Extracti Sarzæ, ʒ iss.; Tinctur. Hyoscyami, ʒ i.; Tinct. Aurantii, ʒ iii.; Syrup. Sarzæ, ʒ ii.; M. Fiat Mistura, cujus capiat partem quartam ter quaterve in die.

No. 267. ℞ Infusi Valerianæ, ʒ x.; Acidi Hydrocyanici, ♏ ii.; Sodæ Carbonatis, gr. x.; Tinct. Cardamom. comp., ʒ i.; Spirit. Lavand. comp., ʒ ss; M. Fiat Haustus ter in die sumendus.

51. iii. *Treatment of the earlier consequences of dyspepsia.*—The treatment of several of these is fully discussed in the articles DUODENUM, FLATULENCE, HEADACH, HYPOCHONDRIASIS, PYROSIS, and STOMACH—*Painful Affections of*. It will therefore be unnecessary to advance much under this head.— *a.* When dyspepsia, in either of its forms, causes frequent attacks of relaxation and soreness of the throat and fauces, or inflammatory redness of these parts with cough, the diet of the patient should be strictly regulated, and mild purgatives, aided by cathartic enemata, prescribed. These attacks should not be neglected in persons presenting any tendency to bronchitis, or to pectoral disease. Some of the severest states of laryngitis and tracheitis have originated in irritative dyspepsia, the symptomatic irritation of the pharynx and fauces extending to the larynx, and exposure to cold, to currents of air, or to other causes, heightening the affection of the respiratory passages. A predisposition to affections of the respiratory organs, or tubercles in a latent state, are then often called into activity by neglected dyspepsia, owing either to symptomatic irritation or to consequent debility. In females, excessive menstruation, as to either the frequency or quantity of the discharge, is often the more immediate consequence, or intervenes between the dyspeptic disorder and the pulmonary affection. In such cases, the treatment should be directed both to the original disorder, and to the consequent affections; and fortunately, much of the means, both medicinal and dietetical, is appropriate to both; the more astringent and refrigerant tonics, and mild or cooling aperients, benefiting the disorder of the stomach as well as the superinduced complaints. To these medicines, ipecacuanha, camphor, and narcotics, will be added with advantage.

52. *b.* The *symptomatic disorder of the heart*, consequent upon one or other of the varieties of dyspepsia, requires chiefly attention to the original complaint. When palpitation is frequent, or the pulse intermittent, after the bowels have been

freely evacuated, and the secretions improved, camphor and ipecacuanha with hyoscyamus, — the sulphate of iron with extract of hop,—the decoction of senega with orange-flower water, or infusion of orange peel, and hydrocyanic acid, — the infusion of valerian similarly combined,— the nitrate of silver triturated with the extract of henbane, or of hop, will severally afford relief. In the irritative states of dyspepsia, particularly if signs of congestion, erethism, or inflammatory irritation, of the villous coat be present, the treatment advised above for this state ought to be premised. At the same time, some one of the warm plasters already prescribed may be applied to the epigastrium. In 1820 I first employed the *nitrate of silver*, combined with narcotics, for a case of dyspeptic palpitation, commencing with half a grain thrice daily, and increasing the dose to one grain. This patient, and others similarly affected, for whom I have ordered this medicine, perfectly recovered. Dr. J. Johnson has strongly recommended the nitrate of silver in dyspepsia; and certainly few medicines are more deserving adoption, when the patient is not alarmed at its use. It should, however, be very cautiously employed. This writer also insists much upon the use of the *sulphate of quinine* in most dyspeptic cases. In small doses, with sulphuric acid, in infusion of roses, it is an excellent medicine at that stage of the treatment when active tonics should be prescribed, especially when much debility is complained of. In order to prevent its constipating effects, it may be given with small doses of the purified extract of aloes, or with the aloes and myrrh pill; and when palpitations and other nervous symptoms exist, camphor and hyoscyamus will be added to them with great benefit. In females who have long laboured under dyspepsia, the quinine taken in solution is very serviceable when the catamenia are too abundant; but in other circumstances, particularly when a *chlorotic* state of the system, and impaired or obstructed menstruation have supervened, the *sulphate of iron* with the aloetic preparations should be preferred.

53. *c.* Of all the consequences of protracted and irritative dyspepsia, *disorder of the biliary functions and disease of the liver*, are the most common. When evidence of congestion, or fulness, or tenderness in the region of the liver exists, then the treatment should be commenced with general or local depletions—with cupping on the hypochondrium, or near the right shoulder-blade, or with the application of a number of leeches near the epigastrium, or around the anus. Small doses of blue pill, or of calomel, ought to be taken occasionally at bedtime, and to be followed by saline aperients in the morning. Alterative medicines consisting chiefly of the alkaline carbonates, or of the liquor potassæ, should be given daily, with taraxacum, sarzæ, and such of the other remedies above recommended, as may be appropriate to the case; but the treatment of this complication is fully discussed in the articles Gall-bladder and Ducts, Jaundice and Liver.

54. *d. Cutaneous eruptions*, both acute and chronic, frequently are associated with the more protracted states of dyspepsia, and are often consequences of these states. Yet they are seldom referred to these sources, or to these conditions of the villous surface of the stomach, of the digestive mucous surface generally, and of the biliary and other excreting functions with which they are so intimately connected. In numerous instances, heating, stimulating, and irritating medicines are prescribed, either prematurely, or at a time or stage of the treatment of these eruptions, when local or general depletions, refrigerants, evacuants, alteratives, and a low cooling diet, ought to have been employed. This remark is applicable also to those early indications of biliary disorder, of affections of the kidneys and urinary bladder, and especially of gout, which so often appear in the course of chronic indigestion.

55. Of the Diet and Regimen in Dyspepsia. Unless the *diet* of the dyspeptic be duly regulated, medical means will be employed in vain. On the subject of diet with reference to indigestion, Dr. Paris, Dr. A. Combe, Dr. Robertson, Dr. Ticknor, Dr. T. J. Todd, and Mr. Mayo, have furnished much information of the best kind, and conveyed it in the most agreeable manner. It is impossible to adduce any thing on this topic which has not been already stated and illustrated by these able writers.—i. *In considering diet with reference to indigestion generally*, there are various circumstances requiring particular notice: 1st, The kinds and quality of the food; 2d, The quantity and congruity of the food; 3d, The times of eating, or the periods which should intervene between meals; 4th, The kind and quantity of drinks; and 5th, The conditions deserving notice in connection with eating and drinking.

56. *A. The kinds and quality of food.* — *a.* Dr. Combe justly remarks, that a direct relation ought always to subsist between the qualities of the food and the nature of the constitution which it is intended to support. The highly concentrated and stimulating food necessary for the support of those who take very active exercise will prove too exciting to the irritable constitution of persons possessed of great activity of the brain and nervous system; and the generous diet, which suffices to rouse or support a phlegmatic system, will prove too nutritive for a person of a florid and sanguine temperament. For persons of a florid complexion, with great activity of the circulation, and a consequent liability to inflammatory diseases, the food ought to be calculated to sooth rather than to stimulate. Red meat, spices, wines, and fermented liquors, ought to be used sparingly, and the principal support derived from soups, fish, mucilaginous vegetables, acidulous fruits, and diluting drinks. In lymphatic persons, on the other hand, where the circulation is weak and slow, and the functions feeble, benefit is derived from a larger proportion of animal food, while vegetables, soups, and fluids, prove relaxing. To these persons, wine in moderation and spices are useful, if much exercise be taken. Persons of a highly nervous temperament, of great excitability and sensibility to impressions, are injured by heating or stimulating diet. White meats, as fowl and fish, farinaceous and mucilaginous aliments, and ripe fruits, are most appropriate to them. Where the bilious temperament predominates, and much active exercise is taken in the open air, a full supply of animal food is necessary, and a moderate allowance of wine or other stimulus is borne with less detriment, if not with more advantage, than in the sanguine and nervous temperaments. Where the constitution is of a mixed nature, a diet composed of animal and

vegetable substances in nearly equal proportions is, under ordinary circumstances, the best. — The food, also, should be adapted to the age, state of health, and mode of life of the individual, and to the climate and season of the year. A diet which would be quite sufficient to a person of sedentary occupations, would be inadequate to support an individual subjected to frequent or constant exertion; and in warm climates and seasons, a smaller supply of food, particularly of a heating or stimulating kind, is necessary, than in cold and temperate countries. In the former but little animal food is requisite; in the latter, especially in very cold regions and in rigorous seasons, an abundant supply of this kind of diet becomes indispensable.

57. *b.* Although there are few articles of diet which a healthy person, leading a sufficiently active life, may not eat with impunity, there are many which ought to be preferred, and others which should be avoided, by the dyspeptic. *Vegetables* are slower of digestion than animal and farinaceous aliments, and more liable to undergo the acetous fermentation in weak stomachs, and to occasion acidity and flatulence. Fat and oily meats are also very indigestible, and give rise to acid or rancid eructations and heartburn. Soups and liquid food are acted upon by the stomach with great difficulty; and, if the diet consist chiefly of them, they furnish insufficient nourishment, and never fail of producing the more severe forms of dyspepsia, and the diseases of debility. Soups are hurtful when taken at the commencement of a full meal; but when little or no animal food is eaten along with them, and rice or bread is taken with them, so as to promote their consistency, they are digested with greater ease. Pastry, puddings, rich cakes, and articles containing fatty or oily matter, are the most indigestible of all kinds of food. Plain well-cooked animal food, particularly venison and game, kept a due time after it has been killed, and eaten in moderate quantity, with bread, or with roasted, mashed, or dry mealy potatoes, or with rice, is one of the most digestible meals that can be taken by the dyspeptic. The kind, however, of animal food, and the modes of dressing it, should depend much upon the state of disorder, and the age and constitution of the patient.

58. *c. Fish* holds an intermediate rank between the flesh of warm-blooded animals and vegetable food, as respects digestibility. It is less nutritious than mutton or beef; and a larger quantity is requisite to satisfy the appetite. Whiting, haddock, and skate, are the most digestible of salt-water, and perch of fresh-water fish. Gurnard, cod, soles, and turbot, are successively richer and heavier, but easier of digestion than mackerel, herrings, eels, or salmon. Eels are, however, more digestible when they are stewed. Salmon is very indigestible, as usually obtained from the London fishmongers, for the reasons stated in the article Disease (§ 46.); but it is not indigestible when quite fresh and properly cooked. The same observation applies to mackerel and herrings. Fish is most digestible when *boiled;* it is less so when *broiled;* and the least so when *fried.* The dyspeptic should eat it dressed only in the first of these ways. Shell-fish is slow of digestion; some much more than others. Raw oysters are more digestible than crabs or lobsters; but oysters, when stewed or otherwise cooked, are heavier than either. Fish is often rendered indigestible by the sauces, &c., taken with it. Vinegar, however, and lemon-juice promote the digestion of it. Malt liquor ought not to be drank with fish. Fruit should not be eaten with it; and milk, likewise, should be avoided.

59. *B.* The *quantity of food* should always be proportioned to the digestive powers of the stomach and the wants of the system. Where waste is great, and growth active, an abundant supply of food is requisite, and the desire for it is commensurate with the demand. Those who lead sedentary lives, and whose circumstances admit of free living, are peculiarly liable to dyspeptic complaints, owing chiefly to the quantity of food indulged in. It is indispensable to a due and natural supply of aliment to the stomach, that attention be paid to the preliminary processes of mastication and deglutition. If these be performed too hastily, too much food will be received in a short time, in a state of insufficient preparation, and the stomach will be overloaded, before the sensation of hunger can be completely allayed. As the dilatation of the stomach by the ingesta, should be gradual, and ought not to exceed a certain limit, and as a definite quantity of gastric juice is secreted, according to the wants of the system and the habits of the individual, if more than the usual quantity of food be taken, the organ will be over distended and a part of it will remain undissolved, producing the usual symptoms of indigestion. Such being the case even with the healthy, how much greater will be the disorder when excesses are committed by the dyspeptic. Sir F. Head very justly remarks, "that almost every malady to which the human frame is liable is, either by high-ways or by-ways, connected with the stomach; and I must own, I never see a fashionable physician mysteriously counting the pulse of a plethoric patient, or, with a silver spoon on his tongue, importantly looking down his red inflamed gullet, but I feel a desire to exclaim, 'Why not tell the poor gentleman at once — Sir, you 've eaten too much, you 've drunk too much, and you 've not taken exercise enough!'" — Dr. Abercrombie observes "when we consider the manner in which diet is generally conducted in regard to the quantity and variety of food and drink, instead of being astonished at the prevalence of indigestion, the wonder should be that any stomach, having such duties imposed on it, is capable of digesting at all." Much, certainly, is to be done in dyspepsia, by attention to the quality of the articles of food, but *much more depends upon the quantity.* Indeed the dyspeptic might almost be independent of attention to the former, if he rigidly observed the latter. This opinion is supported by the experiments of Dr. Beaumont, showing that the power of digestion is limited by the amount of gastric juice provided by the stomach — an amount varying with the modes of life and the wants of the system. It is superfluous to remark that second courses, served up to gratify the pride of the host, overcome the stomach, paralyse digestion, and occasion acute attacks of indigestion.

60. It is impossible to assign any rules respecting the quantity of food that should be taken, as it depends upon so many circumstances. Mixtures of different kinds of food are injurious to digestion,

chiefly by the inducement to excess in quantity, which the variety affords, and by the incongruity of many of the articles. When only one dish is partaken of, Dr. Combe remarks, there is less temptation to exceed the quantity, than when several are tried. The first intimations of a satisfied appetite, are warnings to stop eating, which should never be neglected by dyspeptics. If these be passed by, indigestion or an aggravation of it, where it is already present, will always result. The quantity of food should also have reference to the amount of exercise. When little or no waste is excited by exercise, the supply should be remarkably moderate, as well as digestible. Persons who have removed from the country, where they have enjoyed active exercise in the open air, and have consequently digested well a full diet, generally become dyspeptic when they have removed to large towns, and are subjected to very different circumstances, especially if they continue the same quantity of food, or if they increase it.

61. C. The *times of eating*. In general, five or six hours should elapse between one meal and another. Even in healthy persons, digestion of a full meal is seldom over in less than four hours; and in dyspeptics, it is seldom disposed of until a much longer period has passed. The stomach, also, requires an interval of rest after the process is finished, in order to enable it to enter upon the vigorous digestion of the next meal. If food be taken before the organ has recovered itself from its previous exertion, the secretion of the gastric juices, and the muscular contractions, will be imperfect. The whole of the gastric juice which the stomach can secrete in a given time being engaged in the digestion of the first meal, the one taken too closely upon it will be insufficiently acted upon, and thereby undergo fermentation. The intervals between meals should be in relation to the quantity eaten, and the habits of the individual as to air and exercise. When the latter are enjoyed, the periods may be much shorter than when the habits are sedentary.

62. For dyspeptics, as well as for healthy persons, the meals should be regulated according to the necessary occupations and habits of the individual. For those, observes Dr. Combe, who work by day and sleep by night, an early breakfast, an early dinner, and an early evening meal, will be most conducive to health. But for those who, against the laws of nature, keep late hours, late breakfasts and dinners are preferable. — Persons who eat suppers ought not to breakfast till one or two hours after rising; but those who dine late and eat nothing afterwards, require breakfast sooner. As a general rule, breakfast about half an hour or an hour after rising will be found most beneficial. Those who are obliged to rise very early, should take a cup of coffee or tea with a biscuit soon after getting up, and a more substantial breakfast about three hours afterwards. If exposure to cold, to the morning dews, or to unwholesome air, or to any other cause of infection be incurred in the morning, the stomach should be fortified by coffee or by breakfast. The dyspeptic, especially, ought never to travel, or to enter upon any exertion with an empty stomach, and never with an overloaded one.

63. As a general rule, not more than five or six hours should elapse from breakfast till dinner. For youth and convalescents, and for persons taking active exercise in the open air, the interval may be somewhat shortened; but for sedentary persons, it may be much prolonged. Much, however, should depend upon the appetite, which ought to have returned some time before dinner is taken. According to this, the most suitable time for this meal, is about two o'clock. As many dyspeptics as well as others cannot dine until much later in the day, ought nothing to be taken till five, six, or seven o'clock? or ought a light repast to be taken at one or two o'clock, and the appetite be chiefly reserved for a substantial meal at a much later hour? When dinner cannot be taken until eight or nine hours after breakfast, it will be necessary to have some refreshment in the meantime; but it should be in relation to the time that will elapse until dinner, and to the exercise taken. For persons of sedentary habits, a biscuit and a glass of water will be sufficient; but for the active and the young, especially if the interval be long, a more substantial luncheon is necessary. The habit of resorting to pastry-cooks for refreshment, and of taking wine with it, is generally prejudicial, and particularly in dyspepsia. When dinner cannot be taken until a late hour, it should always be postponed for half an hour or an hour, until excitement or fatigue has subsided.

64. When the dinner is early — from one to three o'clock — a light meal of tea or coffee and bread is necessary; but when the dinner is late, or little exercise is taken after it, tea or coffee should be used merely as a diluent, and no food ought to be eaten. After an early dinner, admitting of time for its digestion and a return of the appetite before a late hour, a third meal, of light aliments, and in moderate quantity, should be taken, particularly by persons engaged in the open air. When ultra-temperance is practised by the dyspeptic, particularly when he lives actively, and retires to bed with an entirely empty stomach, he is quite as likely to have disturbed sleep and unpleasant dreams, as if he had his stomach loaded. He may even be wakeful and irritable, or experience a sense of unpleasant emptiness or gnawing at the stomach. All these may be removed by a basin of arrow-root or sago, about an hour before bedtime. A light supper may therefore be taken, when the dinner is early; but it should be at least an hour or two before retiring to rest.

65. D. The dyspeptic, as well as other valetudinarians, inquire, *What ought we to drink?* but they rarely follow the question by the next important one, *When should we drink?* And they never inquire as to *the temperature at which fluid should be taken*. *a.* Respecting the *first* of these questions, it may be stated, that *water* — either spring water, or toast-water, is the safest if it be taken only according to the dictates of thirst. Whey, fresh small beer, soda water, and seltzer water, are of service in many cases, as will be noticed hereafter; but fermented liquors and wines require greater restrictions. The young dyspeptic ought never to drink any thing but water, toast-water, or whey. The more stimulating beverages will be prejudicial to him, unless during states of debility, for which it may be necessary to prescribe them medicinally. Of all these, spirituous liquors are the most injurious, and ought never to be taken in any form, nor in any variety of indigestion. Some of the asthenic states of the complaint, which are benefited by a moderate

use of wine, are exasperated by spirits, or even by malt liquors. Dr. BEAUMONT found on examining ST. MARTIN's stomach, after a free indulgence in ardent spirits for several days, the villous surface covered with erythematic and aphthous patches, the secretions vitiated, and the gastric juice diminished in quantity, viscid, and unhealthy, although he complained of nothing, not even of impaired appetite. Two days later, when matters were aggravated, the erythematic appearance was more extensive, the spots more livid, and from the surface of some of them, small drops of grumous blood exuded. The apthous patches were larger and more numerous, the mucous covering thicker than usual, and the gastric secretions much more vitiated. The fluids, extracted from the organ, were mixed with much thicker ropy mucus and muco-purulent discharges, slightly tinged with blood. Yet ST. MARTIN complained only of an uneasy sensation, and a tenderness at the pit of the stomach, with vertigo and dimness of vision on stooping. The tongue was covered with a yellowish brown coating, and the countenance was somewhat sallow. After a few days of low diet with mild diluents, the inner surface of the stomach assumed its healthy state, the gastric juice became clear and abundant, the secretions natural, and the appetite voracious. Dr. BEAUMONT adds, that the free use of ardent spirits, wine, beer, or any intoxicating liquor, when continued for some days, invariably produced these morbid states. Eating voraciously or to excess, and swallowing food imperfectly masticated, or too fast, produced the same effects when repeated frequently in close succession. (*Exper. and Observ. &c.* p. 237.). He often observed that, when stomachic disorder, with febrile symptoms, was present, or when influenced by violent mental emotions, the villous coat of the stomach became red, irritable, and dry; and that but little gastric juice was secreted on the food being taken, digestion being very much prolonged. No more wine, therefore, nor more of any other fermented liquor, should be taken, than may be found sufficient to support the strength and ameliorate the symptoms of the dyspeptic, without quickening the circulation.

66. *b.* As a general rule, the *desire for fluids* is the chief indication of *the time* at which they ought to be taken; but large draughts should be avoided, as the stomach becomes suddenly distended, the juices diluted, and the muscular coat weakened by them. Besides, much more fluid may be thus taken than is necessary for the wants of the system. The dyspeptic ought never to drink largely, either during, or soon after, a meal. Frequent sipping, or drinking by mouthfuls, will be much more beneficial, and ultimately, more quenching of thirst. Mild drinks are best taken about three or four hours after a solid meal. It is then that tea and coffee are used as beverages. These are always injurious when made too strong, or taken in large quantity, especially to the dyspeptic. Soda water drank at the time of dinner is hurtful, by distending and over exciting the stomach. Seltzer water is less so; but it is often of service some time after a meal, when there is much thirst. Soda water is then sometimes also of use.

67. *c.* The *temperature at which fluids should be taken* is of the utmost importance to the dyspeptic. *Extremes* of temperature are injurious even to the healthy, and not only to the stomach but also to the collatitious viscera, and to the teeth. The bad effects of the ingestion of large quantities of cold water into the stomach have been often demonstrated; but the subject has been very superficially considered. Dr. BEAUMONT remarked, that a gill of water, at the temperature of 55°, received into ST. MARTIN's stomach when empty, reduced the heat of the organ from 99° to 70°, at which it stood for a few minutes, and then rose very slowly. This experiment explains the injurious effects produced upon weak stomachs by cold fluids taken during digestion, and the fatal effects of very copious draughts of cold water whilst the body is fatigued and perspiring; the shock which the constitution receives from having the temperature of the most vital and central organ suddenly and remarkably depressed, paralysing the other vital movements. It having been demonstrated, that a temperature of 98° is requisite to healthy digestion, it must follow, that the use of ices, and particularly iced creams after dinner, or when digestion is proceeding, will be most injurious. A fit of indigestion is often caused by them; and they seldom fail of lowering the vital tone of the stomach during the digestive process. The moderate use, however, of cold or iced water, or of water ices, when this process is completed, and when there is no exhaustion, is beneficial, by inducing a salutary reaction in the organ. Ices can be only taken slowly, and in small quantities at a time; hence they produce a much less sudden fall of temperature of the stomach than draughts of cold fluids. Dr. DUNGLISON states, that labourers in Virginia were frequently killed by drinking copiously of spring water when over-heated; but that such accidents have rarely occurred since they have been supplied with ice. The proper temperature at which soups, tea, coffee, chocolate, &c., should be taken, may be stated at about 100°; and at this grade of heat, liquids will be found more quenching to thirst than at a higher or lower temperature.

68. *E.* The *conditions necessary to promote a healthy digestion* require a brief notice. The determination of the circulating fluids to the digestive mucous surface and collatitious viscera, and the copious secretion from these viscera during digestion, require that the function should not be disturbed by moral or physical perturbation or exertion. Rest of body and tranquillity of mind for a short time before and after, but particularly after eating, is hence conducive to digestion. Whatever derives the nervous energy and the circulating fluids from the digestive viscera, or causes oppression of these viscera by over-loading the large veins, is injurious during digestion. Hence blood-letting, hot or cold bathing, mental shocks, exertions of any kind, and other circumstances which operate in this way are more or less hurtful. As the quantity of gastric juice requisite to the digestion of a full meal is generally secreted in an hour or an hour and a half after it is taken, or at least within two hours even in the dyspeptic, bodily and mental repose is beneficial during this time. It is thus that a *siesta* after dinner is found so serviceable to the dyspeptic. But, by promoting digestion, it favours supply, diminishes waste, and consequently induces vascular plethora, and the usual consequences of

this state, particularly in respect of the brain and liver. In dyspepsia, the desire for rest after a repast is great in proportion to the quantity eaten, the nervous energy being concentrated in the digestive viscera, in order to dispose of the ingesta. The state of the mind has a powerful influence on digestion: hilarity and ease of mind promote this function; whilst care, anxiety, envy and dissatisfaction, impede it. Dr. CALDWELL remarks, that dyspepsia commences perhaps as often in the brain as in the stomach. It is almost exclusively a complaint of the studious, the scheming, the daring adventurer, the stock-jobber, and the speculator, and of those who, over-exerting their brains, thereby injure them.

69. ii. *Of the Diet and Regimen with reference to the different states of Dyspepsia.* The observations of Dr. TODD as to the diet suitable to the different states of dyspepsia, are extremely just and precise; I shall, therefore, avail myself of some of them. *A. During the asthenic forms of indigestion*, the quantity of food should be reduced to the power of disposing of it; such articles as are difficult of digestion and weaken the stomach being altogether withdrawn.—*a.* The patient should be confined to a spare diet of animal food, and to a restricted use of fluids. A bulky meal ought always to be avoided; and when the appetite is impaired, abstinence will be frequently preferable to the use of stomachics. When the appetite does not fail, which is often the case when dyspepsia is produced by mental exertion, the patient should cease eating before the appetite is altogether allayed. The tea or coffee at breakfast should be taken with very little milk and sugar, and very little butter ought to be used. An egg, lightly boiled, may be eaten by those who take sufficient exercise. The dinner should consist of lean animal food, particularly mutton, poultry, game, and venison, which ought to be roasted or broiled. Bulky vegetables should be avoided; but mealy potatoes, yams, or rice, mixed with the gravy of the meat, young summer turnips, cauliflower, or French beans, may be taken sparingly. The least hurtful fruits are strawberries, morel cherries, and mulberries; but they should be eaten as a part of the luncheon, rather than after dinner. Fluids, even when there is thirst, should be taken slowly, and in small quantity, and always after a meal. If the digestion or habit require the stimulus of wine, old sherry or old port, with an equal part of water, should be preferred; but the quantity of either or of both should not exceed two or three glasses. Twice-dressed meat, *rechauffées*, and made dishes, ought not to be eaten; and the food should be masticated slowly and thoroughly.

70. *b.* The *kinds of food* most injurious in this variety of dyspepsia, and therefore to be avoided, are sweet, mucilaginous, or acid fluids, and such as contain much milk; puddings, compound dishes, and meat pies; new bread, or heavy unfermented bread; compact or fat dumplings, and pultaceous articles; creams, curds, custards, cheese, and all preparations of milk; fat meat, particularly pork or bacon, young meat, all gelatinous parts of meat, and salted or smoked meat; the less digestible species of fish, and all shell-fish; strong broths, gelatinous soups, or concentrated dishes; melted butter, oil, sauces, spices, condiments, and pickles; bulky or flatulent vegetables, especially cabbages, waxy potatoes; pot-herbs, beans, peas, cucumbers, &c.; most fruits, whether fresh or preserved; currants, gooseberries, apples, plums, melons, all kinds of nuts or kernels, and preserves or jellies. Malt liquors, particularly ale, perry, cider, home-made wines, punch, and shrub should also be avoided.

71. *c. Regular exercise* ought to be taken in th open air; and the kinds of exercise that bring th greatest number of muscles into moderate action should be preferred. CELSUS very justly advises persons subject to stomach complaints, to exercise the upper extremities and parts of the body. There are several amusements which have this effect, especially billiards, fencing, rowing, cricket, &c. For females, singing, dancing, skipping, battledore, dumb-bells, and the exercises recommended by Mr. D. WALKER, will be found very serviceable, especially when confined to the house by weather, or when exercise on horseback or on foot cannot be taken.

72. *B.* The *diet and regimen most suited for the irritative states of indigestion* differ considerably from those now recommended. In this variety, bland, farinaceous, and semi-fluid food, in small or moderate quantity, is the most appropriate, until vascular disorder of the villous coat of the stomach is removed by treatment. Saccharine, farinaceous, feculent, mucilaginous, and acidulous articles of food are most easily digested in this condition of the organ. Gentle exercise, as gestation in a carriage or on horseback, sailing, swinging, and walking, is preferable to the more exciting kinds of exercise. After digestion is completed, tepid or warm bathing, and frictions of the surface, are generally beneficial. When vascular excitement is removed, the patient may gradually adopt the diet advised for the preceding variety, beginning with light chicken, mutton, or veal broth, with toast or rice; and afterwards the more digestible kinds of solid food may be used.

73. *C.* The *wines and beverages* best suited for indigestion are old sherry or port diluted with equal parts of water, the finer kinds of claret, hock, white hermitage, and Sauterne; but these should not be taken in the irritative forms of dyspepsia until vascular excitement of the villous coat of the stomach is removed. The diluents most beneficial are seltzer water with a small quantity of hock, or seltzer water with milk or whey, or lime-water with milk or black tea, according to the peculiarities of the case. In the more irritable states of the stomach, whey, goat's whey, small quantities of seltzer water, or the imperial drink, should be preferred. When the state of the urine indicates the impropriety of using vegetable or mineral acids, the alkaline carbonates may be substituted; but, when indigestion has induced a torpid or disordered state of the biliary organs, not connected with inflammation, beverages slightly acidulated with the nitro-hydrochloric acids will be found serviceable.

74. *D. Several mineral waters*, both natural and factitious, are most excellent aids in the treatment of the several forms of indigestion.—*a.* In the *asthenic variety*, the mineral springs of Clifton, Malvern, Bath, and Tunbridge Wells, and the carbonated chalybeate waters of Spa, Pyrmont, Carlsbad, Marienbad, Swelbach, and Eger, on the Continent; or their imitations prepared by Dr. STRUVE, are generally beneficial.—*b.* In the *irritative states* of dyspepsia, the springs of

Harrowgate, of Ems, Plombières, Vichy, and of Marienbad, or other alkaline mineral waters, will be used with advantage. When the functions of the liver are disordered, the waters of Cheltenham or Leamington, or of the Beulah Spa, and the springs of Seidschutz and Pullna may be preferred; but when excitement of the villous coat of the stomach, and when the functions of the excreting viscera are restored, the aerated chalybeate waters, already mentioned, will be most serviceable.

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INDURATION. — Synon. *Induratio* (from *Indurare*) to become hard. *Induration*, *Endurcissement*, Fr. *Induramento*, Ital. *Die Härtung; verhärtung*, Germ. *Hardening*.

Classif. — General Pathology. — *Morbid structure — Therapeutics.*

1. Induration is either *physiological* or *pathological*. The former proceeds — *first*, from the changes which take place in the tissues during the progress of Age (see that article); and *secondly*, from the increased nutrition and vital cohesion, consequent upon great activity of the vital manifestations of the part. This latter state, however, can hardly be termed induration. The *general pathological relations of induration* only require notice at this place. The specific conditions of it in the different tissues and organs are noticed in the articles on the pathology of these parts.

2. i. Induration may exist in a *simple state*, and unconnected with any apparent deposition of fluid or morbid product. In this case, it is merely a greater density of the natural structure, owing to some change in its nutrition, without any morbid secretion or further lesion of organisation. Various tissues and organs occasionally present this alteration, as the brain, the liver, the muscular structure of the heart, the cellular and fibrous tissues, the bones, the glands, pancreas, ovaries, &c. It may be independent of any change in the size or form of the part; but it is often connected with an increase of size, constituting *hypertrophy with induration*.

3. ii. Induration may depend upon an *infiltration of a fluid or solid matter* into the areolar or peculiar structure of a part — of serum, lymph, albumen, fibrine, or even of blood. The excited, or otherwise altered, action of the capillaries of the part may give rise to the effusion of these matters in a more or less fluid state; but they subsequently undergo various changes as to consistence or even organisation, their watery parts being absorbed, and the albuminous or fibrinous portions becoming more or less changed, or even identified with the structures which they infiltrate. Many of the lesions observed in the cellular tissue and parenchymatous organs — in the lungs, liver, spleen, glands, &c. — are owing to this species of alteration.

4. When the matter thus deposited is of a *peculiar or adventitious nature*, whether pre-existing in the blood, or produced by a change in the vital condition of the part, or of the constitution, the tissues, which are the seat of induration, undergo a succession of changes, and they as well as the matter which infiltrates them, or is deposited in them, assume peculiar forms, as in scirrhus, cancer, &c.

5. iii. Induration may proceed from the *absorption of the more fluid constituents of the tissues*. This seldom occurs, excepting from compression, owing to the effusion of fluid, or the development of morbid structures in their vicinity, or in enveloping parts. Effusions in the pleura and false membranes formed on its surface produce this change in the lungs; and the fibrous or fibro-cartilaginous formations in other situations produce a similar alteration, as in the spleen, &c. This form of induration may often be said to be rather a state of condensation or atrophy with induration. The distension, produced by the accumulation of natural secretions cannot be comprised amongst the forms of induration.

6. iv. Indurated parts *vary in appearance* — in colour, size, and form. 1. The *colour* is generally

changed, being often pale, owing to diminished vascularity and the deposit of albuminous matter; and sometimes red, greyish brown, yellowish, &c. These hues evidently depend upon the vascularity, and the state of stagnant fluids, and of effused or infiltrated matters. 2. The *size* of indurated parts may not be changed; more frequently it is increased, and sometimes it is diminished. 3. The *form* of the indurated part may or may not be altered.

7. v. The *causes* of induration may, in general terms, be stated to be whatever excites the vital actions of the part, or occasions a slight or protracted irritation of its capillaries. Induration from compression, however, cannot be ascribed to these causes. M. ANDRAL remarks that,— 1. Irritation may be the first phenomenon apparent, evidently preceding irritation and continuing with it. — 2. Irritation, having produced induration, may cease, induration alone continuing. — 3. Induration sometimes occurs without any evidence of pre-existing irritation. — 4. At an advanced period of induration, the quantity of blood sent to the part is actually less than before its induration, its vitality being also less than before this change of structure. — 5. In some cases, a secondary irritation may arise, at a longer or shorter period after the formation of induration. This secondary irritation sometimes restores the indurated part to its healthy condition; but more frequently it is productive of the most injurious consequences, causing ulceration, softening, &c.

8. vi. TREATMENT. —Induration in vital organs can seldom be ascertained, so as to enable the physician to enter upon its treatment with much hope of success. Alterations of sensation, motion, and size, sometimes lead to a belief in its existence. When these exist with weight or tension, and marked disturbance of function, vascular depletion, general or local, according to circumstances, derivatives and courses of alteratives, are the chief means upon which reliance can be placed. The alkaline solutions, the preparations of iodine, and mild mercurials, with narcotics, are sometimes useful; and the various modes of deriving irritation to external parts, should not be neglected. But both alteratives, deobstruents, and derivatives, ought to be continued for a sufficient time to test their efficacy. When the indurated part is near the surface, deobstruent plasters, and frictions with discutient liniments, embrocations and fomentations, may be severally employed. In all cases, it is necessary to prevent disorder of the digestive organs, to allay pain and irritation by anodynes, to promote the natural secretions and excretions, and to preserve the constitutional powers by light nourishment and change of air. When induration proceeds from compression, the removal of the compressing cause should be attempted, if circumstances admit of its accomplishment.

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INFECTION. — SYN. From *Inficio*. *Contagium*, *Conterges*, *Contagio* from *con* and *tango*, Lat.; *Infection*, *Contagion*, Fr.; *Ansteckung*, Germ.; *Infezione*, *Contagione*, Ital. *Contagion*.

CLASSIF. — GENERAL PATHOLOGY — *Etiology*. GENERAL THERAPEUTICS — *Prophylactics*.

1. In the view which I am about to take of infectious agents, of their operation, and of their effects, it will be necessary to premise a few remarks as to the meaning I would attach to the word *infection*, as well as to other terms which have been usually considered as synonymous with it, or as expressing modes of the same agency. By some writers, the words *infection* and *contagion* have been received as altogether synonymous, whilst others have drawn distinctions between them. Few, however, of the latter have agreed on the subject. QUESNAY first attempted to give precision to the application of these terms, but with little success. Since his time the word *infection* has been commonly applied to the communication of disease from the sick to the healthy, by a morbid miasm or exhalation diffused in the air; and the word *contagion* to the transmission of a specific malady by immediate or mediate contact. But it is obvious that these are merely modes of the same agency in the majority of instances; for the humidity of the air becomes a medium of contact in the former, as much as the clothes of the sick are the media of it in the latter, the chief difference being, that the one acts only by being diffused in the air, whilst the other may act either in the same way, or it may directly convey a consistent virus or morbid secretion. In cases where substances have become the media of absorbing and retaining the morbid emanations or the effluvia of specific diseases, and thereby transmitting them, it must not be inferred that the infection is produced by contact of any part of the external surface of the healthy person with the substance thus imbued. The clothes worn by a person whilst labouring under a disease strictly contagious, even according to the above acceptation, may be so imbued with the morbid exhalation as to retain it for a long time, especially if shut up from the air, and may afterwards emit it upon being unfolded and exposed, and thereby propagate the disease to an individual who has never come in contact with the substance which has thus proved the *fomes* of contagion. Instead, therefore, of considering these distinctions as constituting a true difference, it will be preferable to view *contagion* as a *mode* of infection, to which certain limitations should be attached.

2. M. ROCHOUX considers that infectious agents may be divided into those which, like germs, are capable of reproducing and multiplying themselves as organised bodies, and into those which are devoid of this character, and require for their propagation certain accessories, without which they will not appear. The former of these represent contagions, the latter infections. M. DUPUYTREN observes, that *infection* is the contamination of the air by persons confined in low, close, ill-ventilated, and dirty situations, and by vegetable and animal substances undergoing decomposition, the emanations with which the air is thereby charged acting on man as poisonous agents. The sources of these emanations are

active in proportion to the grade of atmospheric humidity and temperature, and to the nature and quantity of the miasms which the air contains. *Contagion*, on the other hand, he considers to be in many respects independent of atmospherical conditions, and a species of germ or virus developed in the bodies of the sick, or forming an atmosphere around them containing the principle of the malady; and through the medium of this germ, virus, or morbid principle, the malady is transmitted to the healthy. When we consider the diverse states and kinds of agents to which the terms infection and contagion have in general been indiscriminately applied, and the close approximation of several of these agents to each other, as respects their properties and effects on the living economy; and when we further consider the modifications each of them experiences in the ever-varying conditions in which they present themselves, and from the several circumstances and accessory influences which are associated with them, the difficulty of assigning to them specific distinctions will be evident. Yet the difficulty should not preclude attempts at distinctions, and at arrangements founded on such distinctions, as a greater precision of knowledge than now exists will, to a certain extent, result even from a partial attainment of these objects, and will be extremely conducive, not only to an acquaintance with the influences by which these agents are modified, and with the changes they effect on the human economy, but also to the suggestion and acquisition of means by which their effects will be prevented, or be counteracted where prevention cannot be accomplished. The chief fault of distinctions drawn between *infection* and *contagion*, and at the arrangement of the various modes and kinds of these agencies, is, that both the one and the other are based upon preconceived and narrow views of their nature and operation, involving, moreover, various opinions by no means consonant with the usual procession of morbid actions. The obvious course, therefore, is to make distinctions only where differences actually exist, applying terms with precision, according either to their received meaning, or to the sense in which it is desired to receive them, and to arrange phenomena according to the relations established by close observation and candid description. In the following remarks I use the word *infection* in its *generic* acceptation, employing it according to the meaning attached to it by VIRGIL, OVID, PLINY, and other classical writers of antiquity, and by many modern authors; and applying it to whatever may effect, so as ultimately to *taint, pollute*, or *corrupt the body*. I use also the word *contagion* in the sense imposed on it by VIRGIL, PLINY, COLUMELLA, and CURTIUS—as an *infection by immediate or mediate contact*—as a *pollution by the touch*. The word *contamination* may with justice be applied to the deterioration or morbid change which takes place in the fluids of the body during the course of infectious maladies. The terms *morbid impression* and *morbid influence* will represent the change first produced, particularly on the nervous system, by the agents of infection. Although the effluvia or emanations from the sick, the secretions formed in the course of infectious diseases, and the putrid fluids in the bodies of the dead, generally act upon the living, when applied in a manner suited to the operation of each, as *animal poisons*, yet I will restrict this term to those agents which are usually thus designated.

3. From this it will appear that the word *infection* is here employed in its most extensive application; and that the words *contagion, contamination, morbid impression*, or *influence*, are used to express the chief modes in which it takes place, and the chief states in which it may exist. Receiving therefore *infection* as the generic appellation, the other terms represent *species* arranged under it. In other words the frame may be infected — 1st, by the *morbid impression* of agents — *internal* or *self-generated*, or *external and mephitic*, the infection being limited to the individual, and incapable of propagating its kind. — 2ndly, by the *contamination* produced by animal effluvia, the infection being capable of propagating itself in certain ascertained circumstances, and of spreading to the healthy from those affected by these agents. 3rdly, by the *morbid impression* or *contamination* of specific emanations and secretions, the infection presenting certain specific effects, or disseminating and perpetuating specific maladies.

4. The various influences and agents, by which the human frame is infected throughout, come under one or other of these modes of operation. They consist chiefly or miasms or exhalations from vegetable matters in a state of decay; of unwholesome or noxious ingesta; of effluvia from dead animal matter; of the emanations from the healthy in confined situations, and from the sick in several diseases, and in the various circumstances favourable to their accumulation or concentration; of septic matters arising from animal decay; and of palpable or more or less consistent secretions. But several infectious agents may be associated in their operation. The miasms or exhalations from decayed vegetable matter, or from the soil, &c. may be conjoined with the effluvia from animal substances. Some of them may act directly, or in the vicinity of their sources only, as those derived from vegetable and animal decay. Others not only operate in this way, but also through the medium of substances which imbibe and retain them in a sufficient quantity to be injurious. They admit however of certain general propositions being stated with respect to them; and of the following arrangement, with reference both to their nature and effects.

a. Infecting agents consist almost entirely of decayed or diseased organised substances, and of animal emanations or secretions.

b. Those agents which proceed from the decay of vegetable substances or principles, although they infect the frame exposed to their sources, are yet incapable, when unaided, of producing those states of action generating a seminium, or morbid principle by which they may be propagated from the sick to the healthy.

c. Organic bodies in a state of decay or disease, and animal secretions, *infect* the human frame chiefly during states of predisposition or susceptibility of the frame, certain only of which states are ascertained.

d. The *morbid actions* produced by infectious agents generally assume specific forms according to the nature of the agent, so that the agent being known, its effects may be predicated; and on the other hand, the nature of the agent may be inferred from the form and characters of the existing effect.

CLASSIFICATION OF INFECTIOUS AGENTS.

Class of Agents.	*Order of Agents.*	*Species of Agents.*	*Diseases resulting therefrom.*
I. NON-DISSEMINATING, AND NON-PERPETUATING INFECTIONS. *Idio-infectants.*	i. *Miasms or mephitic vapours—Endemic Infection—acting through the air.*	1. Miasms from decayed vegetable matter aided by moisture, in temperate ranges of atmospheric heat.	Catarrhal fevers. Rheumatic attacks. Intermittents. Enlargements of the spleen, and torpid states of the liver.
		2. Exhalations from absorbent, or deep, exuberant, or marshy soils, suspended in atmospheric humidity at temperate grades of warmth.	Intermittents. Remittents. Simple dysentery. Simple cholera. Bilious fevers. Obstructions and other diseases of the liver and glandular organs.
		3. Miasms or vapours from decayed vegetable matter, or from marshes and rich, deep, and humid soils, at high ranges of temperature.	Inflammatory, bilious, and gastric fevers of both a remittent and continued type. Diseases chiefly of the abdominal viscera.
	ii. *Unwholesome and poisonous ingesta* —Infections occasionally epidemic.	Unripe, diseased, or decayed grain. Diseased or putrid fish or flesh. Water containing putrid animal matters, &c. &c. &c.	Ergotism. Gangrenous ergotism. Asthenic and chronic diarrhœa. Dysentery. Scurvy and scorbutic dysentery. Mucous, gastric and putro-adynamic fevers.
	iii. *Self contaminating agents*, or morbid matters formed in a part, afterwards contaminating the system generally.	1. Cancer. Fungo-hæmatoid disease, &c.	The carcinomatous and fungo-hæmatoid cachexy.
		2. Purulent, sanious, or other morbid secretions carried into the circulation.	Acute hectic. Low remittent, and adynamic states of fever, often attended by phlebitis or purulent deposits in the viscera or joints.
II. CONDITIONALLY PERPETUATING INFECTIONS. — *Contaminating infections.*	i. *Animal effluvia.*—Producing diseases propagating the same or similar maladies in favourable circumstances. *Conditionally and consecutively infectious*, chiefly by means of diffusive and impalpable emanations.	1. Effluvia from animal matter or from vegeto-animal matters during decomposition, aided by humidity.	Adynamic or pernicious remittents. Continued fevers. Adynamic dysentery. Cholera. Gastric, mucous, or enteric fevers.
		2. Emanations from living bodies in close or unventilated situations.	Adynamic putro-adynamic, and malignant fevers. Malignant dysentery.
		3. Emanations from the secretions and discharges of the sick confined in close apartments, &c., and the direct application of these secretions.	Erysipelas. Hospital gangrene. Phlebitis. Puerperal fever.
	ii. *Animal secretions and septic animal matters.* —Infectious chiefly by contact, or inoculation of a palpable matter; *chiefly sporadic.*	1. Morbid secretions in recently dead bodies.	The irritative fever, or malignant effects produced upon opening recent bodies, by the morbid secretions poured out in serous cavities.
		2. Animal matter in a state of putridity or decomposition.	Diffusive or disorganising inflammation of cellular parts. Inflammation of lymphatics of veins, &c.
		3. Morbid secretions communicated from the lower animals by contact or inoculation.	Glanders. Farcy malignant pustule and other affections arising from contaminating diseases in the lower animals.
		4. The poisonous bites of insects and reptiles.	General vital depression, and septic disorganization, or solution of the vital cohesion of the tissues.
III. SPECIFIC INFECTIONS. — Infections immediately or mediately disseminating and perpetuating their kinds, by a morbid impression, or by contamination, or by both. Capable of retention and communication by Fomites.	i. *Impalpable specific infections* of susceptible persons. Diffusive or volatile infections, frequently epidemic.	Emanations from the secretions, excretions, and surfaces of persons already affected. — Propagating their kind by a diffused and impalpable effluvium, or vapour.	Epidemic and exanthematic typhus. True yellow fever. Pestilential cholera. Pertussis.
	ii. *Palpable specific contagions.* Consistent contagions.	A specific secretion or virus from the seat of disease perpetuating maladies always presenting the same characters.	Rabies. Syphilis. Gonorrhea. Scabies. Yaws. Sivvens. Frambœsia. Purulent or Egyptian Ophthalmia. Cow-pox. Pellagra. Porrigo.
	iii. *Infectious both diffusive and consistent.*—Often epidemic.	Diffusive and impalpable emanations, and consistent secretions, from the bodies of the infected, either of which may produce the same disease.	Chicken-pox. Scarlet fever. Small-pox. Measles. Malignant puerperal fever. Plague.

5.—I. THE SOURCES OF INFECTION.—According to the extensive sense in which I have employed the term infection, its sources or agents are numerous and diversified. They may be arranged —1st. Into Idio-infectants, or those which produce diseases incapable of perpetuating their kinds, unless other causes be superadded; — 2d. Into those which produce maladies which may be propagated under favourable circumstances — or into *conditionally perpetuating infections*; — and 3d. Into *Specific Infections*, or those which produce diseases which perpetuate their kinds, both immediately, and mediately by *fomites*.

6. i. — Under the FIRST CLASS may be arranged those infections derived from (*a*) endemic sources; — (*b*) from the ingesta; — and (*c*) from morbid matters generated in the body, and conveyed into the circulation, thereby contaminating the whole frame. The diseases proceeding from these sources never give rise to the infection of the healthy, unless they are modified in their characters by superadded causes, or unless they are materially influenced by determining or consecutive circumstances. — A. The *miasms or exhalations from the soil* produce a great variety of diseases according to the temperature and humidity of the air, and the quantity or activity of the miasms floating in it; but the diseases thus produced will not propagate themselves. If, however, other causes are superadded, — if the persons labouring under disease from this source be confined in ill-ventilated apartments, or breathe a close air

loaded with animal exhalations, the disease may change its form, and assume some one or other of those which arise from the *second class* of causes — from animal effluvia, — and thus become consecutively and conditionally infectious. I could adduce numerous instances of diseases, originating in local or endemic sources, becoming thus infectious. Livy adduces more than one instance of it; and numerous others are furnished in the medical histories of wars and campaigns; but unfortunately the circumstances connected with them have rarely been recorded with precision, and sometimes not even with impartiality.

7. *B.* — The *use of unwholesome food* infects the body with disease, which is not capable of being communicated to the healthy under ordinary circumstances. But persons affected with diseases from this source may be exposed to additional causes which will change the character and course of these diseases, and give rise, as in the foregoing instances, to a truly infectious property. It is well known that unwholesome and scanty nourishment will produce scurvy, scorbutic dysentery, and low or adynamic fevers. These fevers are generally not capable at first, or as they immediately proceed from this cause, of propagating their kinds, but they frequently assume this character, owing to states of the air, to insufficient ventilation, and to the manners and imperfect civilization of those amongst whom they occur. Proofs of this were furnished in Italy and France during 1815, 1816, and 1817, — at Marseilles in 1812, and 1813, — in Ireland during various periods, particularly since the commencement of this century, and even in the present day in some parts of England. The disease which prevailed in the Penitentiary, and which was so ably described by Dr. Latham, and the fevers now prevalent among the poor, are proofs of the infectious characters which distempers thus originating generally assume. I am convinced that the low dietaries assigned to the poor in the Union workhouses, in connection with crowding, and with imperfect ventilation, in many of them, have been a chief cause of the present prevalence of typhus throughout the country. And although the infectious visitation may not have reached those who have been the prime movers in the iniquity, yet it may overtake some of them with no measured retribution. Persons who require the aid of the Poor Law have usually as respects food or drink, and sometimes as regards both, lived fully or intemperately; and when they are subjected to a diet, altogether insufficient for the continuance of health even in the temperate, low fever, which readily propagates its kind among the predisposed, and on occasions favouring communication, soon makes its appearance. This result the more certainly follows, when numbers are similarly circumstanced, and placed in buildings possessing no thorough ventilation or perflation of air. The only recently erected Union workhouses which I have seen, are most improperly planned, inasmuch as they have windows only looking into the interior of the Court, of which they form three of the sides. This is shameful if it proceed from ignorance, and flagitious if it be done designedly. We can hardly suppose architects so ignorant of the most generally acknowledged principles of their art, as to neglect ventilation where it is most required. Are we therefore to consider that they have been controlled by those who have sacrificed feelings of humanity to the expediency of political economy?

8. — From considerable observation and reflection, I infer that disease may take place sporadically, or from local causes; and owing to various circumstances acting either in close succession or coetaneously, the circulating and secreting fluids, and even the soft solids, may be so changed during its course, as to emit an effluvium contaminating the surrounding air and thereby infecting many of those who breathe this air in a sufficiently contaminated state; and thus the disease will be propagated to several, and from these to others, especially under favourable circumstances of temperature, humidity, electrical conditions and stillness of the air, and of predisposition on the part of those who come within the focus of infection. Thus diseases may become *infectious*, and, when aided by the constitution of the air, and other circumstances, even *epidemic*. After thus spreading for a time, they may cease or entirely disappear with the circumstances which combine to propagate them.

9. *C.* — The *Self-contaminating agents*, or morbid matters formed in a part, and afterwards infecting the system generally, but seldom, perhaps, give rise to disease, capable of propagating its kind. When sanious or purulent matters are carried into the circulation, the consequent alteration in the blood gives rise to phenomena closely resembling typhoid or low fevers in many cases; but I do not believe that the malady thus produced will infect the healthy, unless under circumstances peculiarly favourable to infection, as in puerperal females, in the wards of lying-in hospitals. I think it extremely probable, that the sanious fluid constituting the lochia may be absorbed or imbibed from the surface of the uterus, particularly when the uterus contracts imperfectly, or when the discharge is retained or accumulates, and when vital power is much depressed, and that the consequent pollution of the circulating and secreted fluids will give rise to an effluvium which may produce puerperal fever in a female recently confined, if she come within the focus of infection. It is not improbable, that erysipelas also may be excited by the effluvium emitted from a person thus diseased. I attended with another practitioner, a case of dangerous puerperal fever of this kind. A lady visited this patient, and leant close to her mouth, so as to hear her faint articulations, but perceived her breath so offensive, and felt it produce so unpleasant a sensation on her own face, as to induce her to remove to a greater distance. This lady continued to perceive the unpleasant odour, and to feel the sensation in the face until the following day, when she experienced chills with swelling and redness about the nose, extending over the face: — a complete attack of erysipelas followed.

10. That the morbid secretions of persons affected with low fever, consequent on the absorption of morbid matters, into the circulation, will infect the healthy frame when inserted into a wound or under the cuticle, or even when applied to a mucous surface, is by no means improbable. I have seen the most dangerous diseases arise, from the inoculation, and even from the contact of the fluids during the examination of the bodies of females, who had died of puerperal disease, caused

by the passage of sanious or morbid secretions into the circulation, as well as by the influence of an impure air. The danger of infection or inoculation from these cases is great in proportion to the shortness of time that has elapsed from dissolution; and it is particularly great when the body still retains some of its warmth. The above considerations and facts prove that, although the several orders of agents comprised under the *first class* produce merely a sporadic form of infection, or infect merely those exposed to their sources, and give rise to diseases generally incapable of propagating their kind, yet the concurrence of additional causes or influences, during their course, will develope a disease capable of being communicated to the healthy under circumstances of predisposition, and in similar modes, as well as by the same media, as the diseases produced by the class of agents next to be noticed.

11. ii. *The second class of agents.* *A.* Effluvia from *animal exuvia* and *animal secretions and excretions* directly occasion those forms of disease which infect the healthy by contaminating the surrounding air. The particular *form* or *species* of malady thereby produced, depends much upon the nature of concurrent causes — upon the concentration or accumulation of the effluvium, — upon its sources, — upon its admixture with miasms from decayed vegetable substances, — upon the temperature, humidity, and electrical states of the air, — upon the susceptibility or state of predisposition of those exposed to it, — and upon pre-existing disorder. The operation of some of the sources of infection falling under this head has been disputed. Dr. Bancroft, by a laboured special pleading, has denied the injurious influence of putrifying animal substances; but much depends upon the temperature in which this process takes place, the concentration of the emanations arising from this source, and epidemical states of the air. When the temperature is low, and ventilation is preserved, no very acute or sudden disease results from this cause, particularly to those accustomed to it, although a gradual loss of health generally follows its continued or frequent influence. But in other circumstances, particularly when aided by concurrent causes and marked susceptibility, febrile diseases of a low or adynamic form, and of an infectious character, where free ventilation is not preserved, generally appear. The emanations from the lower animals, as horses and cattle, crowded in ill-ventilated places, produce infectious diseases, not only amongst them, but also in those of the human species, who may breathe for some time the air which is thus contaminated. Livy, Dionysius of Halicarnassus, and Orosius, mention a destructive disease which appeared in Rome 464 years before Christ. Livy states that it occurred in Autumn from the crowds of countrymen and herds of cattle received within the walls of the city; that it was aggravated by the infection arising from the crowded state of the close buildings, by the heat and want of rest; and moreover that the disease was propagated by contagion and by the attendants on the sick. The same historian records that, in the 325th year from the foundation of Rome, a remarkable drought and famine extended throughout the Roman territory: that diseases followed, first invading cattle, and afterwards infecting the rustics and lower classes of people, and then extending to the city. That disease of an infectious nature may be developed in the lower animals by their confinement in close or ill-ventilated places has been proved on numerous occasions; and there is no reason to doubt the possibility of the distemper thus produced being communicated to the human species. A number of horses shut up in the hold of a transport will generate glanders in some of them, the morbid secretion of which will communicate a similar disease to persons employed about those which are affected, especially if it come in contact with the mucous surfaces. It may be stated as an axiom, that the foul air generated by the crowding of many persons or animals into a confined space, even in health, but more especially in disease, as in the wards of hospitals, &c.; or by a few persons only in the same apartment, if their diseases be attended by copious discharges, will infect those who breathe it in a state of predisposition, with low fever, dysentery, &c.; and that the persons thus infected will communicate the malady to others similarly predisposed. Although animal effluvia infect the healthy chiefly by their diffusion in the atmosphere, yet the infection will not take place, unless near their sources, or in situations where they become concentrated. Much, however, will depend upon the predisposition or susceptibility of persons exposed to them.

12. *B.* Certain maladies do not perpetuate themselves by effluvia or by an impalpable emanation, but by *the contact of the secretions formed in their course;* and these secretions will seldom induce disease unless they be inoculated, or come in contact with a mucous surface. Other secretions, particularly from diseased animals, when brought in contact even with the unabraded skin, will sometimes produce serious distempers. Instances of this fact are furnished by the malignant pustule, and by other maladies already noticed. The inoculation of putrid animal matters, and the bites of poisonous reptiles, infect or contaminate the whole frame in a sufficiently remarkable manner, the former agents producing a low, irritative, or adynamic state of fever; but the diseases thus produced seem incapable of propagating their kind, unless by the inoculation of morbid matters formed in their course, or taken from the body after death; and then the effects will probably vary with the previous state of health of the person thus infected, and with various concurrent circumstances.

13. iii. *Of the Third Class of Infectious Agents.* It is unnecessary to add any thing to the statement contained in the classification of these agents, which I have attempted. The impalpable emanations and consistent secretions of which they consist, produce specific forms of disease, whether they operate *directly* or by various *media*, or *fomites.* But, although the chief characters of these maladies are uniformly preserved, in all of them, during their transmission, yet several of them are much modified by concurrent causes, by the circumstances, or existing states, of the affected, and by endemic and epidemic influences.

14. II. Of the Proofs of Infection, *or the circumstances proving a disease to be capable of propagating its kind.* It has been asserted by some recent writers, that the doctrine of infection, by contact or otherwise, is a comparatively modern invention. These assertions have been made by

persons possessed neither of sufficient medical learning nor practical information, to attach any degree of importance to their opinions. It has been satisfactorily shown by Dr. Yeats in this country, by Dr. Marx in Germany, and Dr. Omodei in Italy, that the doctrine of contagion was recognized by the ancient Egyptians and Jews, by the Greeks and by the Romans: and that it was equally believed in during the middle ages, although the notions of many respecting it, even among professional writers, were often loose and inaccurate It is unnecessary to adduce proofs of the acquaintance of the ancients with contagion, as this has been done so satisfactorily by the writers just mentioned. Some evidence also on this subject will be found in the article Epidemic Influence. Indeed the matter would never have been questioned, had not commercial men, in order to remove some impediments in the way of their traffic, properly imposed for the public good, employed persons to write in favour of their interests; but with an ability and success quite commensurate with the truth and justice of their cause. The question, however, as lately agitated, is not so much the existence or non-existence of infection or contagion in any circumstances, and as respects all diseases, for proofs of the possession of these properties by certain maladies are so incontrovertible, as not to be doubted. It is principally with respect to the infectious nature of pestilential epidemics, as plague, yellow fever, and epidemic cholera, that the subject has created so much interest and discussion at the present day. When we consider the extent to which the dread of the importation of these maladies impedes commercial undertakings, in connection with the little consideration human life receives in the prosecution of commercial objects, it is not likely that the contingent importation of infection will operate in such a manner, as long to prevent attempts at the removal of existing salutary restrictions; although the *proofs* as to the existence of an infectious property in these distempers, are considered quite conclusive by all candid inquirers.

15. i. There are various circumstances which, singly or conjoined, *prove* a disease to be *truly infectious*, or capable of propagating itself. — 1st. The arrival in places which are healthy of persons from districts in which a disease is prevalent, and the spread of such disease soon afterwards in the previously healthy place. — 2dly. The extension of such disease in this place, in proportion to the intercourse between the affected and the healthy. — 3d. The greater prevalence of such disease amongst persons who devote themselves to its alleviation, as amongst medical attendants, nurses, and the friends of the sick. — 4th. The absence of any other cause to which the malady may be attributed, the soil, the climate, the season of the year, the weather, neither singly nor conjointly, serving to account for it. — 5thly. The immunity obtained by seclusion and by avoiding communication with the sick and those who have visited them, as well as by the careful exclusion of all substances which may have imbibed and retained the emanations from the affected. — 6thly. The success of measures taken to prevent the extension of the malady, as the early removal of the sick to places where communication with the healthy is prevented. Besides these, there are other proofs, which are even more conclusive. When we perceive the healthy become affected with a malady, soon after proximity to, or contact with, a person labouring under a similar malady, or after having been exposed to substances which have imbibed the effluvium from the sick, as bed and body-clothes, &c., the evidence of infection from these sources, although not amounting to complete certainty, yet nearly approaches it. Instances of contagion by *inoculation*, and by immediate or direct communication with the sick, are sufficiently numerous in respect of several maladies, and are familiar to all: and the evidence of infection by substances which have imbibed a morbid effluvium or secretion — by *fomites* — is not less strong, although it is in some cases not so conclusive, and hence it has been more frequently impugned. It has been satisfactorily shown to all candid minds, and numerous instances have occurred to my own observation, of a disease having been conveyed in the clothes of a second person, and communicated to a healthy individual. That this has occurred with respect to certain maladies acknowledgedly infectious, cannot be disputed by the most captious objector. The only questions admitting of doubt are, — to what diseases should this capability of propagation be extended: and for how long a period, and under what circumstances, may the infectious effluvium be thus retained and conveyed. Some answer to the first of these questions will be obtained by what is hereafter to be advanced; as to the second, it is impossible, from the nature of the subjects involved in it, to furnish precise information. There is every reason however to state, that the body-clothes or bedding, used by a person while sick of an infectious disease, may communicate the same malady several or even many months afterwards, if they have been shut up from the air; and I have known several instances of a disease being conveyed from the sick to the healthy, the person, who has been the medium of communication, having walked a distance of upwards of two miles in thus conveying it.

16. ii. *Of the media by which infectious agents are communicated to the healthy frame.*—*a*. The *miasms* or *mephitic vapours*, exhaled from the sources already enumerated, are evidently suspended, and rendered active, by the humidity of the atmosphere, in the situations in which they are disengaged: for it has been repeatedly shown, that these miasms are active in proportion to the grade of atmospheric humidity, and to the circumstances which augment that humidity. Their presence in the air brings them in contact with that part of the animal economy, presenting the greatest extent of surface, the greatest vascularity, and the freest communication with the circulating system. Although the atmosphere, aided by humidity and a moderate or high range of temperature, is the usual medium of infection, especially in respect of those maladies, which emit an offensive effluvium or emanation; yet there are other media which observation has shown to be not infrequent means of communication. Numerous substances imbibe, retain for a considerable time, and convey, the invisible or *infectious* emanations, as well as the palpable and *contagious* virus, or consistent secretions of the sick, and become media, by which infection is conveyed from one person or from one country to another, between

whom a greater or less distance is interposed. Of the various materials, which may thus be the means of transmitting infectious diseases, animal productions, particularly woollen and hairy substances, bedding and body-clothes, furs and feathers, have the greatest disposition to imbibe and to retain the morbid effluvium. The *length of time*, during which the morbid *seminium* may thus be retained and still be operative, has never been accurately determined. Probably the period varies with the disease from which it proceeds. There can be no doubt that it depends much on the exclusion of the atmosphere, and upon the temperature to which it has been exposed.

17. *b*. When infection is produced by substances which imbibe and retain the morbid effluvium or secretion, it does not arise from actual contact with the substance which is thus the medium of communication, unless it conveys a more or less consistent virus or secretion. The substance imbued with the morbid effluvium retains it whilst shut up from the air for a longer or shorter period, but more or less readily imparts it when exposed to the atmosphere, which now becomes the infecting medium. Even the clothes of an attendant upon a person labouring under an infectious disease, will retain the morbid emanation much longer than is generally supposed. There are few who will dispute the fact of infectious diseases being often communicated in the clothes of medical men, and other attendants on the sick. I have known several instances of small-pox, puerperal fever, and pestilential cholera, being thus propagated. I was recently called to the wife of a physician in the most malignant form of small-pox, conveyed to her by her husband whilst he was in attendance on a case of this disease at a considerable distance from his own residence. Sometime ago I was requested by a practitioner in extensive midwifery practice, to see a case of true puerperal fever. He had, within a few days, lost five patients from this malady. I asked him to consider whether he might not have been the medium of communicating the disease to most of them. Before my attendance on this case terminated, he expressed his conviction that he had communicated the malady to four at least of the six. Similar instances have been mentioned to me by other obstetric practitioners. — I am convinced of having conveyed the infection of pestilential cholera in my clothes, in two instances.

18. *c*. The infection or contamination caused by ingesta, or by substances used as food and drink, is generally not so rapid in its progress or so dangerous, as when the infectious agent acts through the medium of the air upon the lungs, or when it is conveyed into the system by inoculation. Some, however, of the more active poisons may be said to furnish exceptions to this law, but they hardly come within the present category. Unwholesome articles of food generally infect the system by a succession of morbid changes requiring more or less time for their developement; and much of their baneful effects is counteracted by the vital influence and resistance of the stomach, and by the changes produced by the gastric juices. Still, in proportion to the injurious nature of the substances received into the stomach, will the organic nerves be morbidly impressed, or the chyle and blood contaminated, by the noxious fluids or matters absorbed from the digestive canal, or both kinds of disorder be induced, the effects varying with the activity of the injurious agent, and the duration or repetition of its operation. A morbid emanation, which would produce an immediate effect upon being inspired with the air, will be quite inoperative when received into the stomach mixed with the saliva: and a morbid secretion or virus, which would be followed by the most dangerous results when inserted under the cuticle, may be swallowed with impunity. The matter of small-pox will produce no effect when conveyed into the stomach of a person, who will be readily infected by the effluvium or the virus of the disease; and the same obtains with respect to other contagious maladies. The immunity from the one medium of communication, and the ready operation of the others, are accounted for by the structure and functions of the organs and parts to which the infecting agent is applied. From this the ignorance of pathological principles displayed in the silly and disgusting attempts to prove certain maladies to be non-infectious or non-contagious, by tasting or swallowing the secretions to which they give rise, will be sufficiently evident.

19. *d*. In cases of general infection of the frame, resulting from a local source of contamination existing in the body itself, the media of infection may be readily inferred. Cancerous, sanious, or purulent matters may be formed in a part of the body; and as long as nervous power, and vital resistance are not materially depressed, either the mischief is limited, or attempts are made at throwing it off; but as the system becomes weakened, the disease extends, absorption takes place, the morbid matter carried into the circulating vessels vitiates the blood; and hence arise imperfect and disordered secretion and excretion, insufficient digestion and assimilation, and a general infection of the fluids and solids of the body.

20. *e*. The *effluvia* or *emanations* from a number of persons even in health, shut up in a confined space, or in ill-ventilated apartments — from the lower animals similarly circumstanced — from the sick in crowded wards, &c. — and from those with infectious or contagious diseases, generally operate almost entirely through the medium of the atmosphere, and with an activity in proportion to the humidity of the air, and to the accumulation of the noxious effluvium, relatively to the susceptibility or degree of predisposition of those exposed to its action. But as all the emanations from the sick consist in a great part of watery vapour, even a dry air, if it be not quickly renewed, will at length become so moist, as to be soon as injurious as that which was already humid. Moisture favours the developement of infectious emanations, increases the activity of all of them, and heightens the predisposition of persons exposed to them. Experience has shown that the emanations from the sick seldom infect the healthy, whilst the air is dry, cool, and freely renewed; that infectious diseases seldom occur or appear only sporadically in such circumstances; and that these diseases generally prevail or become epidemic in warm, humid, and stagnant states of the atmosphere. The crowded wards of hospitals, ships of war and transports, generally continue healthy, as long as dryness and freshness of the air are preserved. But as soon as these requisites to health are neglected; when the floors of the former, or the decks

of the latter are frequently washed, so as to render the air moist; the emanations from the healthy as well as from the sick readily accumulate or acquire activity. Fevers, dysentery, scurvy, erysipelas, and even hospital gangrene or phagedenic ulceration and phlebitis, will thus be developed or rendered prevalent.

21. *f.* Although there are various agents which infect the body in a certain determinate mode or medium, — as typhoid and exanthematous fevers, by the emanations proceeding from those affected by them floating in the air, — syphilis, by contact, — rabies, by inoculation, &c., — yet there are others, as arranged above, which operate in more than one, or by all these modes. There are some sources of infection respecting which we are still insufficiently informed as to the several modes or media of their action. A person on opening a recent body that has died of peritonitis, may have a pustular or erysipelatous inflammation of the skin of his hands, with smart fever produced, although there has been neither puncture nor abrasion of the cuticle, and if either has existed his life will be placed in the utmost jeopardy. Mr. KIERNAN informs me that he has even seen, from the inspection of cases of this description, very severe constitutional disorder produced in those who had never touched the bodies which were examined. In these instances, the effluvium exhaled from the peritoneal cavity or from other internal parts, upon first exposing them, must have infected the system.

22. III. THE EFFECTS, OR THE DISEASES, PRODUCED BY INFECTION vary with the sources and modes of infection, with the concentration or intensity of the infectious agents, and with the predisposition or susceptibility of the persons exposed to them. Certain of these agents produce a determinate effect, or a specific form of disease, particularly those comprised under the third class. — *A.* It has been supposed, that the terrestrial miasms or mephitic vapours, emitted by marshes and other sources of malaria, produce only intermittent and remittent fevers. Some writers, however, have contended that true yellow fever, and even plague, also spring from these sources, aided by the influence of high ranges of temperature and an epidemic state of the air. That terrestrial miasms are capable of producing, under these circumstances, pernicious or malignant forms of fever, which assume either a remittent or a continued type, according to concurring causes and the state of the patient, I will readily admit; but that they occasion either true yellow fever or plague, is an assumption founded on preconceived and fallacious views, which every circumstance connected with the origin and pathological relations of these maladies fully disprove. (See Art. PESTILENCES.)

23. That malaria, however, produces a wider range of diseased action, than has been long supposed, I will allow; for I agree with much that has been advanced by Dr. MACCULLOCH on this subject, and believe, that the less concentrated states of terrestrial exhalation, particularly in low grades of atmospheric temperature, will give rise to several diseases usually imputed to other causes, — as to catarrhs or catarrhal fevers, rheumatism, neuralgic affections, sciatica, obstructions of glandular organs and premature decay. When terrestrial exhalations are concentrated or rendered more active by a warm and humid air, bilious inflammatory remittents, gastric or mucous fevers, cholera, dysentery, and visceral diseases will frequently result, according to the existing disposition or states of those exposed to them.

24. *B.* The contaminating effects of unwholesome kinds of food and drink frequently declare themselves in specific forms and modes. Ergotism, gangrenous ergotism, scurvy, scorbutic dysentery, adynamic dysentery, &c., are illustrations of this. On many occasions, however, the ingesta constitute only one of the sources of infection, or other causes concur with this in producing the effect. Mucous, gastric, and putro-adynamic fevers and dysenteries, even when chiefly occasioned by septic or diseased articles of food, or by water containing putrid animal matter, are often aided in their appearance by additional causes: when foul water is concerned in the production of septic or adynamic maladies, animal or vegetable exhalations, or both, and unwholesome food, frequently co-operate with it. The fevers and dysenteries so generally developed in armies, in besieged towns, &c., seldom proceed from a single source of contamination only. When they assume highly infectious and typhoid forms, it will generally be found, that putrid and impure food and water, exhalations from animal exuviæ, and from the surrounding soil containing numerous dead bodies imperfectly covered with the earth, famine, fatigue, and the depressing passions, first contaminate the frame; and that the exhalations from persons confined in close places, and from those first affected by those causes, heighten still further the morbid effects, until a most malignant malady is produced. It is extremely probable, that the air of a place thus circumstanced, and especially the moisture floating in it, may become so saturated with noxious effluvia derived from these sources, as to assume a pestilential character; the infection extending to nearly all who breathe it, but becoming less remarkable, as the distance from the focus of infection increases. Hence it is, that in large, crowded, or populous cities, particularly in seasons when the temperature is high and the air humid, and is already contaminated by the circumstances which necessarily attach to them, and especially by exhalations from animal exuviæ and burying places, the infectious emanations from the persons first attacked by the resulting febrile maladies heighten the existing aerial contamination, produce a more marked effect, and more readily spread the malady in these places than in those differently circumstanced. During the pestilence in Rome, during 262 and 263, the air is stated by EUSEBIUS and CEDRENUS to have been so contaminated by the emanations from the sick and dead, that the dew which fell in the mornings and evenings presented a sanious or putrid appearance on the surface of objects. It is chiefly owing to this circumstance that when an infectious disease becomes very destructive, or assumes a pestilential form in crowded cities, it seldom spreads extensively in districts far removed from them, although it is generally communicated to a greater or less extent to the healthy, by those who have left the source of infection, and by *fomites;* for the circumstances favourable to the infection are there wanting.

25. That continued fevers of a low, adynamic, typhoid, or putro-adynamic character, dysentery, erysipelas, hospital gangrene, phlebitis, puerperal fever, diffusive or disorganizing inflammation of cellular parts, and the diseases enumerated in

the Classification, as the results of the various kinds of contaminating or infectious agents comprised under the *second class* of my arrangement, arise from these sources, may appear paradoxical to many. But an extensive examination into the subject will show that animal affluvia produce those diversified effects, according to the nature of the effluvia, to concurrent circumstances, and to the peculiarities of the persons affected; and that the resulting maladies perpetuate their kinds, when the conditions favouring this occurrence are present.— That morbid actions, often of a most dangerous and malignant kind, follow the inoculation of morbid secretions and septic animal matters, although these secretions may not have been taken from a person labouring under a disease generally recognised as being infectious or contagious, has been evinced on various occasions, and shown even by experiments. Much, however, in these cases, depends upon the health of the persons who may be thus inoculated. The general persuasion that diseases usually recognised as contagious, alone can be communicated in this way, is by no means correct, for the range of infection by inoculation is much wider. Indeed, I consider it as a pathological principle, that morbid secretions and septic animal matters, from whatever source, will, if applied to an abraded or divided living surface, or allowed to remain in contact with a mucous, or even with the external surface, give rise to some one of the maladies assigned in the Classification to this order of agents; and that the morbid matters generated by these maladies will produce similar effects in others, if applied in the same way, provided that a predisposition to the infection exists. This predisposition manifestly consists of depressed constitutional power, and weakened vital resistance, often in connection with disorder of the digestive organs, and sometimes with general cachexia.

26. The maladies which are produced by the third class of agents, or by *specific infections and contagions*, are, with few exceptions, so generally recognised as the results of the operation of these agents, as to require no remark. The diseases that may be viewed as exceptions to this mode of origin by some writers, whose powers of argumentation and knowledge of the sources and course of morbid actions have secured for them but slight reputation with competent judges, cannot be more particularly alluded to in connection with their sources at this place.

27. C. *The diseases produced by infectious or contagious agents may be modified or aggravated, by superadded or consecutive causes.* — This is especially the case with those febrile maladies, which arise from endemic sources, and from animal effluvia. The emanations from the sick of these maladies, if allowed to accumulate around the patient, particularly where several are confined in ill-ventilated places, will aggravate the disease, impart to it new characters, and an infectious atmosphere may be thus generated capable of producing a modified, or even a different, but generally a much more malignant, malady, than that which originally existed. The aggravation of diseases by the accumulation of the emanations from the sick, or from any other source productive of infection, obtains generally. On the other hand, free ventilation exerts a beneficial influence, and prevents the contamination of the circulating fluids, as well as the depression of vital power that would otherwise result.

28. Humidity and dryness of the atmosphere have much influence upon inflectious maladies. The former not only gives activity to infectious agents, but also aggravates their effects, and predisposes the human frame to their operation. Infection is, in the first instance, thereby favoured and accelerated; and it is subsequently aggravated in the whole progress of its resulting phenomena. Dryness of the air, on the other hand, either prevents infection, or delays the development of its effects. The depressing passions, fear, and whatever lowers vital energy, are most influential and powerful concurring and aggravating causes of infection, both before it is fully developed, and during the course of its effects.

29. IV. OF THE PERIOD WHICH ELAPSES FROM THE FIRST IMPRESSION OR OPERATION OF INFECTIOUS AGENTS, TILL THE DEVELOPMENT OF THEIR EFFECTS.—The period which elapses from exposure to the agents of infection until the development of their effects, varies remarkably in its duration, as respects not only different infectious maladies, but also different persons exposed to the impression of the same agent. This period has been denominated the *latent* period and the period of *incubation* by French pathologists. I have, in the articles DISEASE and FEVER, called it the *formative*, *premonitory*, or *precursory* stage, or the period of *premonition*, because the changes taking place in the constitution during this stage are productive of the subsequent phenomena, and are generally manifested by certain symptoms, attention to which may often prove of essential service in the prevention or treatment of the consecutive disease. The *duration* of this period has been differently stated by different writers, as respects almost every infectious disease. In some of these diseases it is quite indeterminate; but, as regards others, it is more uniform. — *a*. The precursory period of diseases which proceed from terrestrial or paludal emanations, varies from six or seven days, to as many months. From data obtained by Dr. GREGORY, it would appear, that of a number of persons exposed to malaria proceeding from the same source at a precise period, thirteen days were the shortest, and thirty-nine days the longest, duration of this period; and that in the greatest number, agues and remittents were developed on the 20th and 22d days after infection. In some cases, where I had an opportunity of observing this period, remittent fever appeared in some six or seven days, and in others a few days later, after exposure to the cause. Dr. MARSH infers, from numerous instances furnished him in Ireland, that this period may be protracted to eight or nine months.

30. *b*. The duration of the formative period in *typhoid fevers* has not been observed with sufficient precision. Dr. HAYGARTH declared that the minimum was seven days, and the maximum seventy-two days. Dr. BANCROFT inferred the minimum period to be thirteen days; but the observations of Sir W. BURNETT, Dr. MARSH, and others, prove that the period is much shorter. Dr. MARSH, indeed, endeavours to show that the febrile rigor may succeed almost immediately to the exposure to the infectious effluvium. But in many of the instances which he adduces, there is every reason to suppose that a previous exposure to infection had occurred, *that* which seemed to have made the morbid impression having only been a consecutive or determining cause of the disease. Dr. WILLIAMS thinks that this period may extend

from a few hours to a few weeks, or perhaps to a few months. I have stated, that it may not continue beyond twenty-four hours in the worst forms of these fevers, and that the most common duration is from three to fourteeen days. This agrees with some observations which I have lately had an opportunity of making. Dr. Gregory considers that the medium duration of this period in these fevers is ten days.

31. *c.* The precursory or formative period in *measles* generally continues from seven or eight, to fifteen or twenty days. Dr. Bateman states it to vary from ten to fifteen days. Dr. Gregory from eight to twenty-one days. Dr. Williams remarks, that the time which this poison might remain latent has been determined to vary from ten to sixteen days. This agrees with the observations of Dr. Heberden and of Dr. Hue. — Dr. Home, who first tried the inoculation of measles, observed that the eruption appeared on the sixth day afterwards. The experiments of inoculation in measles by Vogel, Monro, Tissot, Cullen, Speranza, and others, furnish no additional information on this subject.—M. Guersent is of opinion that *hooping-cough* appears five or six days after infection. I have stated that it is generally from five to nine days, or even longer, after exposure to infection, that the cough commences.

32. *d.* In *scarlet fever*, the formative period varies in duration from one, to twenty or twenty-five days. Dr. Williams considers that it continues from a few hours to about ten days. Dr. Binns assigns two days as the shortest period; Dr. Withering three or four days; and Dr. Heberden and Dr. Frank five days; Dr. Blackburn believes that the period varies from four to seven days; and Dr. Willan, that it rarely continues longer than six days. The duration of this period depends much on the character of the epidemic. Dr. Maton observed, in one epidemic, this stage prolonged to twenty-five or twenty-six days. In a most malignant case of the disease, which I recently attended, infection was produced by some of the secretion from the mouth of a patient having been conveyed by the hand to the glans penis of a different person. Most violent asthenic inflammation and excoriation extended thence over the genitals, to the groins, abdomen, and inside of the thighs.

33. *e.* In *small-pox*, the duration of the precursory period varies from six, to twenty or twenty-one days. When the disease appears in the natural way, or by the medium of the air, Dr. Gregory thinks twelve days to be then the usual period.—When small-pox is *inoculated*, the eruptive fever commences seven days afterwards, but it may be delayed a day or two longer. Indeed, cases occasionally appear, in which this period is either shorter or longer than that now stated.

34. *f.* In *plague*, the precursory period may be very short. Sir Brooke Faulkner has mentioned some cases, in which the attack seemed to follow almost immediately, or within a few hours, upon the impression of the infectious effluvium. Some writers have stated this period to vary from two to fifteen days, five days being its medium duration. The disease has occurred on the fourth day after its inoculation. — *True yellow fever* usually appears from two to twelve days after infection; but it may take place in a few hours after the impression of the morbid effluvium, when concentrated. — In *pestilential cholera*, the precursory period varies from one to six days, according to my own observations; and this agrees with the statements of others. This period may, however, be somewhat shorter or much longer than now stated.—True or *malignant puerperal fever* usually occurs from one to five days after infection, but it may be delayed beyond this period.

35. *g.* The time that the infection of *erysipelas* takes to develope itself has not been accurately determined. Dr. Williams thinks that it may vary from two to fourteen days. In the instance above alluded to, and in some others that I have seen, the period was not longer than thirty-six hours. In the various forms of infection proceeding from the inoculation of morbid matters, or from injuries during the dissection of recent or of putrid bodies, the constitutional effects are usually manifested within three days, sometimes in the course of a few hours and very rarely after four days.

36. *h.* The morbid secretions productive of the various forms of *venereal disease* evince their effects at various periods, between one or two days and two months. The *gonorrhœal* affection generally appears much earlier than the *syphilitic;* the former most frequently showing itself from two or three days to ten or twelve, — the latter from six or seven days to two or three weeks.

37. *i.* The virus of *rabies* takes a longer time in developing itself, than any other infectious agent. There can be no doubt of the precursory period of this malady being sometimes prolonged much beyond what is generally believed, although the very long intervals stated to have elapsed in some instances are quite apocryphal. There are, however, well attested cases of two years having passed from the insertion of the virus until the appearance of the malady. Instances of from four to twelve months having thus elapsed are by no means rare. The *shortest* period of premonition in rabies may be stated to be twenty-one days. In the greatest number of cases, the disease appeared from thirty-one to sixty-three days after the inoculation of the morbid secretion.

38. *After the first impression* of an infectious agent, until the development of its effects, or during the whole of this percursory period, the change produced in the economy presents certain general features, which are of the utmost importance to recognise, and to estimate aright. These changes are not materially different in the different infectious maladies: they vary, however, in intensity as much as in duration; but they often possess very nearly the same characters, which always manifest the production of a more or less noxious effect upon the economy — as depression of nervous and mental energy, and of all the manifestations of life. These manifestations are, however, severally depressed in different degrees, in different maladies, during this period; and certain organs experience this effect more than others, as well as betray a specific or peculiar mode of affection according to the nature of the infectious agent. In those distempers which proceed from the more intense or concentrated agents, and in which the precursory period is short and severe, the effect produced upon the nervous system is generally immediate and remarkable. Not only are the physical functions depressed and embarrassed, but the mental and moral powers are remarkably weakened or nearly

annihilated. In true yellow fever, in plague, and puerperal fever, the patients become indifferent to their fate, and care not for the most intimate relations. The sensibilities are not merely blunted, they are almost destroyed; and a similar effect is observed in many other infectious maladies, although not in so remarkable a degree. Much of the calmness displayed by persons in this, as well as in the more advanced stages of these diseases, results not so much from a philosophical or stoical suppression of the sentiments and emotions, as from a generally impaired power of the organic nervous system, and a consequent impairment or loss of the general sensibility, and of the cerebral energy. Hence the physical change is often such, that those parts of the frame which are the most intimately related to the manifestations of mind, or which either minister to them or are their instruments, are more or less incapable of discharging their offices.

39. V. THE SYMPTOMS OR INDICATIONS OF INFECTION vary remarkably in the rapidity of their production, in their intensity, and in their numbers, forms, and modes of grouping. But it is of importance that they should be recognised by the physician. When the infecting agent is intense, as when a concentrated animal effluvium or an accumulated emanation from the bodies of the sick is directed upon a susceptible person, then the effect may be as instantaneous as electricity, as well as most intense. In some rare cases of this kind, as in plague, and in other pestilential maladies, life may be destroyed in a few hours by the morbid impression which it has been quite incapable of opposing, and against which it has been unable to react. I have seen the emanations from typhoid fever, from yellow fever, and from pestilential cholera, immediately produce sickness, vomiting, pain, sinking and anxiety at the epigastrium, faintness, oppression at the chest, remarkably weak pulse, headach, and general vital depression, with pale countenance and shrunk surface; and from these the patient has never rallied, the symptoms increasing in severity, and others supervening, until death has occurred in a very few hours.

40. Where the agents are less active or less concentrated, or where the predisposition is not so great, a much longer time is taken in the development of the changes constituting the precursory period of infectious maladies; and in the majority of those, the vital powers resist the further progress of these changes in that particular direction, and a salutary *reaction* is established. In many instances, little or no complaint is made after exposure to infectious agents, although a morbid impression has actually been made by them. In some only a slight *malaise,* or an indefinite feeling of indisposition, indicative of depression of vital power, only is complained of. In others, the depression is much more manifest, and is attended with a weak or slow pulse, or with unusual acceleration of the pulse upon slight exertion; with chills, alternating with flushings or heat of skin, depression of spirits, and pallor of the countenance, great weakness of the joints, and impaired power of the digestive, secreting, and excreting functions. When infection is produced through the medium of the respiratory organs, the earliest effect that is observed is a feeling of constriction or oppression in the chest, or at the præcordia and epigastrium, attended by frequent sighing, gaping, forced and deep inspirations, and by uneasy sinking, depression, or nausea, and sometimes by pain at the stomach, and by vomiting. The natural and acquired appetites and desires are diminished or nearly abolished; nausea is readily excited by food; and the bowels are either costive or relaxed, or easily acted upon by purgatives. All the organic functions are impaired, and the sexual desire suppressed. The patient feels debilitated and fatigued; complains of headach, vertigo, or confusion of ideas; is morose, low spirited, sluggish, indolent, or incapable of exertion, or of directing his attention long to any object: he readily perspires, and his breathing becomes short and quick, on the least exertion. His sleep is unsound and unrefreshing, and he wakens, complaining of lassitude or of pains in his back and limbs. All the cerebro-spinal functions are weakened or disordered. The countenance and skin are unusually pale, sallow, or unhealthy; more rarely red; the eyes are languid and deficient in brilliancy; the breath is fœtid or cool; and the tongue is often loaded—occasionally red or flabby. The urine is sometimes pale and copious; and the cutaneous surface is dry, cool, and harsh or constricted. These symptoms are sometimes so slight as to escape particular attention, and are often insufficient to induce the patient to confine himself. They are frequently much more intense, without being different as to kind; their intensity increasing more or less rapidly, until a sensation of cold running down the back, with formication, chills, or rigors, supervene, indicating the approaching development of the malady.

41. When infection is produced by inoculation, the more immediate effects are somewhat differently manifested, according to the nature of the morbific agent; and, in those maladies which require a long precursory period for their full formation, several of the above symptoms are either altogether wanting, or are so slight as to escape detection. In some instances, persons actually infected may complain but little, or may experience merely slight debility, inaptitude for exertion, various dyspeptic symptoms, and depression of spirits. At last some consecutive or determining influence comes in operation, and the infectious agent, thus reinforced, soon produces its full effects.

42. In some instances, the premonitory period is characterised by remarkable mental depression, by a reserved manner, and by the anticipation of an approaching calamity or even death. When a person who has been exposed to infectious agents, particularly those which are liable to become epidemic, is possessed with the idea of his impending dissolution, this unfortunate termination generally takes place. This symptom, more, perhaps, than any other, indicates a dangerous functional lesion of the nervous system.

43. *There are various circumstances which favour or retard the development of infection.*— Several of them have been already noticed (§ 27.). Many of those which favour the development of infection, not only render the consequent disease much more severe than it would otherwise have been, but also complicate that disease, and impart to it a fatal tendency. Exposure to wet and cold, unpleasant or distressing intelligence, a debauch, excessive fatigue, and exhaustion from

any cause, during the precursory period, will not only accelerate the effects of infectious agents, but also give rise to inflammation, or congestion, or obstruction of some vital organ. This often occurs in measles, scarlet and typhoid fevers, hooping-cough, small-pox, &c. — Dr. Marsh justly remarks, that a principal reason of the danger and fatality of fever amongst medical practitioners is, that, during the latent period, they make an effort day after day to discharge their laborious duties, until at length they are reluctantly compelled to yield; the disease having gathered strength in the same proportion as they have made strong, but ineffectual, efforts to resist it. A slight illness may be prevented by a strong effort, but a severe one is thereby greatly, often fatally, aggravated, and this is not the case merely in respect of fever, but of every malady produced by infection. The circumstances which retard or prevent the development of infection will be considered hereafter, when the pathological views here stated will be applied to practical purposes.

44. VI. The Manner in which Infections and Contagions invade the Economy, and their immediate and direct Effects, have lately excited some discussion. And let it not be supposed that the subject is devoid of importance. For correct views respecting it will lead to the adoption of means for the protection of the system, both at the time of exposure and in the period which more immediately follows it, that will often prove successful in counteracting its earlier effects, or in rendering the course of the disease more mild. — *A.* It is now about twenty years since I endeavoured to show, by anatomical connections, by functional relations, and by intimate observation of the effects produced by the more energetic morbific agents, that their impression is first made chiefly upon *the organic nervous system,* although the change or effect thereby produced, necessarily soon extends to the vascular system, and even to the circulating fluids; and that this takes place when the infectious agent is inserted into a wound, as well as when it is inhaled into the lungs with the air. At the same time I endeavoured to show that certain agents may more especially affect the circulation by their imbibition or absorption into the blood. This is more especially the case when the infectious agent is received into the alimentary canal with the solid or fluid ingesta, or when it consists of morbid secretions formed in an organ or part admitting of their passage into the circulation. There can be no doubt of the respiratory organs being generally immediately affected by all those agents which are conveyed through the medium of the atmosphere. The cutaneous surface is sufficiently protected from the operation of the impalpable emanations constituting the most common and the most numerous infectious agents. The digestive mucous membrane, although less guarded than the cutaneous surface, is still less exposed than it to their action. It is chiefly, therefore, through the medium of the respiratory surfaces that these agents make their direct impression. On these surfaces the air may be said to undergo a process of digestion — certain elements or portions of it entering in the circulation, combining for a time with the circulating fluids, and promoting their perfect sanguifaction and assimilation; and from those surfaces certain gaseous fluids and elementary principles are given off, which have served their purposes in the economy. There is every reason to infer, that during this process, noxious matters floating in the air, or dissolved in the moisture of the atmosphere, produce a morbid impression upon the nerves supplying these surfaces, and upon the respiratory organs generally; and that this impression is more or less rapidly transmitted throughout the organic nervous system, — the other organs and general systems of the body, more immediately dependent upon this system, soon manifesting the effects thus produced. At the same time, the noxious emanations, thus conveyed to the lungs in the course of the respiratory functions, most probably affect the condition of the circulating organs and of the blood itself, — both these orders of effects taking place co-ordinately, or either of them in a more or less special manner. That certain infectious agents impress the organic nervous system directly and chiefly, is shown by the suddenness of the effects; by the sensations experienced at the time of exposure to those agents, especially to the emanations conveyed in the air; by the sense of constriction and oppression produced in the chest; by the frequent and forcible efforts made to dilate or fill the lungs, as if the impression of the infectious emanation had impaired the vital resiliency of these organs; by the offensive odour frequently perceived at the time of infection; by the sickness, fear, and alarm instantly afterwards felt; and by the other phenomena already enumerated.

45. *B.* Next to the impression and change in the nervous system of organic life, the alterations in *the circulating organs and fluids,* consequent upon infection, deserve attention. When infectious effluvia are inhaled into the lungs, the weak action of the heart soon indicates the depression of this system. The impulse of the heart is feeble, slow, or irregular, and oppressed. The pulse is weak, soft, compressible, or small — sometimes irregular. It indicates a want of tone; and when the infectious agent has acted with much intensity, absolutely or relatively, the sensation imparted by the artery suggests the idea that the contractility of the coats of the vessel is much impaired. From this defect of the contractility and tone of the blood-vessels arises, during the precursory period of diseases produced by the more energetic infections, the remarkable tendency to congestion of those parts of the circulating system, and of those vessels, which are the most removed from the influence of the heart's action. Hence the congestions of the spleen, of the portal vessels and hepatic veins, and of the sinuses within the cranium; and hence the retarded circulation through the lungs, and the fulness of the auricles and sinuses of the heart, giving rise to the sense of oppression at the præcordia and in the chest, and to the frequent sighing and forced inspirations attending this stage of disorder.

46. The effects produced by infection on the *blood* are not so immediately, or at least not so sensibly, evinced, as those induced in the functions of organs actuated by the organic nervous system. The blood may, however, be affected without the alteration being perceptible to the senses; and changes in the appearances of this fluid are usually visible, before alterations in its constitution can be detected by chemical tests or analysis. The pathological conditions of the blood during the earlier

stages of the diseases consequent upon infection have not been sufficiently observed, and far less satisfactorily investigated. Those which have been described are the results of prolonged or intense morbid action, probably aided in some cases by treatment and regimen. I have given, in the article Blood, a full view of those alterations, and explained their sources. But the subject, with all its interest and importance, has not since received any further elucidation. The state of vital depression, immediately produced by infectious agents, generally precludes the abstraction of blood, and the opportunity of observing its states. I have, however, seen some instances of blood having been taken from a vein during this state, owing to a misinterpretation of the headach, pain at the epigastrium, and oppression at the chest then complained of, and to the epidemic disposition to vascular depletion so prevalent amongst practitioners, excited and promoted as this disposition was by inexperienced writers, who inflicted their crudities and inanities upon the public, as well as upon the profession, soon after the commencement of the present century. In most of these cases the blood flowed with difficulty, was of a very deep or dark colour, and produced syncope or great depression upon the loss of a few ounces. It coagulated rapidly, and separated into a very dark, large, and soft coagulum, which sunk in the serum; this latter being small in proportion to the clot. In some instances the separation was very imperfect, the coagulum being gelatinous; and occasionally no separation took place, particularly when the powers of life were remarkably depressed. The blood taken at the commencement of the cold stage of agues often presents the same appearances, but generally in a less degree. These appearances indicate rather the vital conditions of this fluid derived from the organic nervous system supplying the vascular system and vital organs, than any change in its chemical constitution. It is not probable that the *hæmatosine* is materially altered, or that the saline ingredients and albumen have undergone any diminution, as the circumstances upon which these appearances depend have not been sufficiently long in operation to produce these effects. The *fibrine* is, however, changed or diminished; this substance evincing, by its attraction and cohesion, the state of vital or nervous power. When the fibrine contracts slowly, firmly, and so as to form a firm clot, and allow the free separation of the serum, or to give rise to a buffy or cupped surface of the coagulum, the nervous and vital powers are unimpaired, and vascular action is increased, and generally increased in proportion as this state of the coagulum becomes more remarkable. When, on the other hand, the fibrine adheres quickly, but imperfectly; when the attraction between its molecules is weak, and consequently, when either no coagulum is formed, the blood assuming a gelatinous consistence as it cools, or when the coagulum is loose and soft, with merely a slight separation of the serum, this latter either surrounding it in a small quantity, or partially, or altogether covering it, the constitutional powers may be considered as greatly reduced; and, although the circulation may be accelerated, its tone and energy are much impaired, the vital contractility of the coats of the vessels upon their contents presenting a weak *antagonism* to the action of the heart.

47. The occasions on which the blood seems to be more immediately contaminated by infectious agents, are, first, when a specific virus or morbid secretion is inserted into a wound, or beneath the cuticle; and secondly, when putrid or septic matters are similarly applied. The period which elapses between the inoculation of a specific virus, and the development of the constitutional affection, however, by no means shows that the immediate operation is upon the blood, and that this period is required for the production of morbid changes in it. If we examine the subject closely, we can arrive at this conclusion only, — that the morbid matter affects first the vital conditions and actions, and ultimately the intimate organisation of the part to which it is applied—converting the appearances and sensible properties of the part to states somewhat similar to those characterising itself; and that the contamination thus produced, soon extends, either by its immediat effects upon the organic nerves supplying the vessels of the part, and consecutively on the blood or by the imbibition or absorption of the morbid matter, or by both these channels, to the whole body, affecting more or less the blood, the secretions, and the soft solids. That the organic nervous system is the chief channel by which the first change induced in the part is communicated to the whole body, is shown by the circumstance of the constitutional effect being frequently as great whilst the local change is slight, as afterwards when it has become fully developed. Although the precise channel of primary infection cannot easily be demonstrated in cases of infection by inoculation, yet the ultimate effects, as respects both the solids and fluids, are sufficiently apparent. The facts and illustrations contained in the articles Blood (§110. *et seq.*), and Fever (§18.526.), render further remark on this topic almost unnecessary. That the blood undergoes, at an earlier or later period of most infectious diseases, a remarkable change as respects its appearances and sensible properties, is sufficiently established. In what the chemical or intimate change may consist, has not been shown by analysis. There can be no doubt, however, that in the advanced progress of some of these maladies, the saline principles of the blood are either diminished in quantity or altered in their combinations, as shown by Dr. Stevens. Indeed, this may be considered as a necessary consequence of the abstraction, during the disease, of the usual saline substances contained in the food. When the quantity of *chloride of sodium* used by an individual in the twenty four hours is considered, in connection with the fact that the whole of it passes into the circulation, we must expect a remarkable diminution of this salt, or of its base, in the blood of persons who have been but a few days affected by febrile or infectious maladies. The earliest changes, however, produced upon the blood are manifestly those of its vital conditions.

48. It is very reasonable to suppose that the influence exerted by the organic nervous system upon the circulating organs and vessels throughout their whole extent, and thence upon the contents of these vessels, will alter the appearances and conditions of these contents, as itself becomes altered by the influence of infectious agents; and that the effect thus produced upon the circulating fluids will reciprocate the morbid affection, and heighten disorder in the system more immediately

and directly impressed, — that, in short, nervous influence, which first experiences the morbid change, in communicating this change to the vascular system and circulating fluids, soon undergoes a further alteration, owing to the changes it has itself produced in these fluids. In some instances, however, and especially when putrid matters are applied to a wound, a more rapid contamination of the circulating fluids may be inferred. When these matters, or when morbid secretions, or blood in an advanced period of malignant or putrid diseases, are injected into the circulation, it is but reasonable to infer that the effects will be more immediate, and that they will be in most respects similar to the morbid conditions characterising the advanced stages of the malignant or putro-adynamic maladies produced by self-perpetuating infections or contagions. The interesting experiments of GASPARD, MAJENDIE, LEURET, and HAMMOND have fully established the truth of these inferences, as shown in the article just referred to.

49. *C.* The morbid impression made upon the organic nervous system, and the change induced upon the circulating organs, by infectious agents, necessarily *affect the secretions and excretions.* As the secreting and excreting organs are actuated chiefly by the organic nervous system, and as the vital manifestations of this system are remarkably depressed by infectious agents, the functions of these organs must consequently be more or less impaired soon after infection. It is chiefly owing to this circumstance, that the blood becomes altered in the progress of infectious diseases. In the article already noticed, I have fully shown that the imperfect performance of the functions of depuration is a chief cause of the morbid states of the blood; and that, as these functions are impaired in proportion as vital power is diminished, so must the secretions and excretions be disordered both in the early and in the advanced stages of infectious maladies. In the former of these stages, even the period of premonition, the disorder of these functions is often manifest, but they are diminished rather than vitiated. In the advanced stages, they are prominently vitiated as well as diminished; and sometimes, even when the vitiation is most remarkable, they are sufficiently abundant or even remarkably copious.

50. *D.* The *alterations produced in the soft solids by infection* are the latest in the procession of the consequent morbid phenomena, and vary remarkably with the nature of the infectious agent. Some of those agents produce certain determinate or specific effects upon the tissues. Thus the effluvium of small-pox affects the skin and mucous surfaces especially; — that of scarlet fever, the throat, digestive mucous surface, skin, and the membranes of the brain; — that of measles, the respiratory and cutaneous surfaces, &c.; — that of plague, the lymphatic system and glandular organs; — that of erysipelas, the integuments and cellular tissue; — that of syphilis, the absorbent glands, the periosteum, the skin, bones, and joints; and so on, as respects most kinds of infectious diseases. — These alterations are, however, much modified, or additional lesions are developed, by consecutive changes or influences; by the temperament, predisposition, or previous disorder of the patient; or even by the treatment, — as when certain complications appear from these or other circumstances, at the commencement, or during the course, of infectious fevers. Amongst the changes induced in the soft solids by infectious agents, the most important, and evidently the most intimately dependent upon the state of vital manifestation and the conditions of the circulating and secreted fluids, are the discolouration and the softening of membranous and parenchymatous structures. This discolouration and softening, as observed soon after death, are perfectly independent of incipient dissolution of the tissues, and are generally great in proportion as the infectious or contagious nature of the agent is remarkable. The general loss of the vital cohesion of the tissues is often so great, that even the most firm and coherent structures are torn with ease; the substance of the heart, and muscular parts, also participating in the change. (See art. FEVERS, § 527.)

51. VII. THE CIRCUMSTANCES WHICH FAVOUR INFECTION are numerous, and it is of importance that they should be recognised and well understood by the physician. These circumstances may be grouped — first, into those which are *intrinsic*, which concern the individual, or are proper to the recipient; — secondly, into those which are *extrinsic*, or which concur or co-operate with the infectious agent. — *a.* The circumstances proper to the recipient of infection are numerous, but the chief only of them can here receive particular notice. There is a *susceptibility* to infection from birth, which, in respect to some infections, diminishes with age, or is entirely exhausted or destroyed by the disease which it produces. This destruction of the susceptibility to infection is remarkable, as regards the exanthematic contagions, yellow fever, and hooping-cough; and, although it is not universal, yet the exceptions are very rare. In certain infectious maladies, as continued and typhoid fevers, the susceptibility increases with the progress to puberty, and diminishes gradually from the twenty-fifth or twenty-seventh year to old age. The danger, however, increases with this diminution, if infection actually takes place. Although typhoid fevers do not entirely exhaust the susceptibility to their infection, they manifestly weaken it. When a person has escaped infection, upon the first or the earlier exposures to several infectious maladies, he will generally continue to possess an immunity, unless circumstances should occur to increase his predisposition; for the infectious emanation produces a more sensible and marked effect on the economy, on the first occasion of exposure to it, than subsequently unless long intervals have elapsed between the periods of exposure. It is thus that several members of the same family so often escape, notwithstanding the rest are labouring under infectious maladies, — the susceptibility to them diminishing with the frequency of exposure, unless concurrent causes or influences reinforce the infecting agent.

52. The kind of susceptibility, which disposes to infection, varies much with different infectious maladies. In some, as typhoid fevers, youth and the prime of life are predisposing circumstances; and yet, fear of the disease, fatigue, exhaustion, and other causes altogether of an opposite character, have a similar influence, and concur with it. In others, as yellow fever, the seasoning, pernicious, and malignant fevers of warm climates, persons in the prime of life, and of the most robust

and plethoric constitutions, are the most liable to infection; whilst remittents and agues usually affect, in preference, the more debilitated, and persons of a weaker and more delicate frame. Most of the maladies, which are capable of propagating themselves, exhaust the susceptibility to reinfection. The chief exceptions to this are—venereal affections, plague, and purulent ophthalmia; whereas, the infections which are incapable of propagating themselves, unless other causes be superadded, particularly those which consist principally of emanations from decayed vegetable products, leave after them an increased disposition to reinfection. A person who has once had an attack of periodic fever, is more susceptible of infection upon exposure to malaria; and a smaller dose of the poison will take effect.

53. Of the other sources of susceptibility to infection, the most important are — fear and the depressing passions, disorder of the digestive organs, general ill health, and whatever impairs the powers of life. All infectious agents produce a morbid impression on the nervous system, and contaminate the circulating and secreted fluids, with a rapidity, and to an extent, *cæteris paribus*, according to the weakness of vital power and resistance. When the nervous influence and vascular tone and action are insufficient to oppose these agents, the infection then takes effect; the morbid influence extends; the circulating fluids are either early contaminated, or soon become deteriorated; and thus the whole frame is brought, not only under the influence of, but is actually polluted by, the disease.

54. There are other circumstances which predispose to, or increase, the susceptibility of infection; but they are so well known, in respect both of their nature and modes of operation, that they need not be noticed at this place. They are chiefly *extrinsic* to the body; and either precede, or are nearly coetaneous in their action with, the infectious agent. Those which *subsequently come in aid* of this agent, and aggravate, modify, and complicate its mode of operation and effects, have already been alluded to (§ 27.). They will be found more fully discussed in the articles DISEASE (§ 61.), and ENDEMIC AND EPIDEMIC INFLUENCES.

55. VIII. THE MEANS WHICH PROTECT FROM INFECTION, AND COUNTERACT ITS IMPRESSION AND OPERATION, are of the greatest importance, as respects both the science of the physician and the safety of the community. These measures may be divided into — 1st, Those which protect by excluding and destroying infectious agents, or by preventing communication with infectious persons or things; — and, 2dly, Those which are prophylactic, and which guard or fortify the individual against the impression or contamination of infections and contagions. — *The first of these classes of preservative means may be subdivided into* — 1. Quarantine, and the separation of the infected from the healthy; — 2. The exclusion of infected articles, or the destruction of all infection existing in them; — and, 3. The dilution and destruction of the infections floating in the air, or in any other medium.

56. *A. The separation of the infected from the healthy* is the chief means by which a distemper can be prevented from extending. This can be enforced only by governments, and local authorities, when a pestilential or infectious epidemic threatens a country or district. To the neglect or imperfect accomplishment of the measures which belong to quarantine, is chiefly to be imputed the extension of pestilential maladies, particularly in countries bordering on the Mediterranean. The difficulty, however, of putting these measures in force, and the facilities of evading them, especially by the transmission of infected clothes and other fomites, and as regards continental countries having an extended boundary, or populous cities or towns having an extensive communication, are so great, that numerous instances of their infraction must occur, and the chances of the introduction of these maladies be thereby increased. The extension of plague, yellow fever, and pestilential cholera, in different countries, has been entirely owing to the neglect of quarantine and of other means of prevention. If these means could be duly enforced in all their relations, not only those, but other infectious maladies, as typhoid fevers and small-pox, might be either entirely excluded from certain localities, or remarkably limited in their spread, particularly where the situation and boundaries of a place favour the application of these means.

57. Next to the exclusion of infected persons or things from a place, the removal of those first infected to suitable places, where they may be properly treated, and where the extension of the disease is duly guarded against, is of importance. The habitations of infected persons should undergo the processes of cleansing, fumigation, &c., about to be noticed; and all intercouse between the infected house, and those adjoining, ought to be prevented, or placed under certain restrictions. In large commercial towns, and in populous districts, where a strict quarantine or sanatory measures, calculated entirely to prevent a malady from extending, cannot be maintained, the mischief resulting from the attempt will be greater than the benefits which will arise to the community. But where they may be enforced, owing to the nature of the locality and other circumstances favourable to their due maintenance, they should be adopted, notwithstanding the temporary losses, or even distresses, of the place thus sequestered; for the advantages of the few should give place to the safety of the many.

58. As intimately connected with all regulations of quarantine and seclusion, *the duration of the period which elapses from the impression of the infectious agent, to the development of the disease*, should be taken into consideration. On this subject, the information which I have attempted to give (§ 29.) will be found useful. It is obvious that a person may be exposed to a source of infection in one place, and may travel a long distance during the period of formative or smouldering action, and not experience the developed malady until after his arrival in a healthy locality, where he may introduce the infection. In the present day of rapid conveyance, a person may carry an infectious malady, which he has caught in London, to any of the remotest parts of the kingdom, or from almost any European country to this.

59. It is of no less importance to know *the time which a person who has been ill of disease capable of transmission from one to another, retains the power of infection*; but this is a matter of still greater difficulty, even than the knowledge of the duration of the precursory period. The body

itself, probably, loses the power of transmitting a malady, as soon as convalescence is so far established as to admit of free exercise in the open air. Probably a fortnight after the commencement of recovery from most infectious maladies, the power of spreading them has ceased. Where a disease has been communicated at so late a period as this, there is every reason to suppose that the clothes have been concerned in its communication. It is, however, most difficult to assign a precise period with reference to any infectious malady, as its duration will entirely depend upon the personal habits of the individual, upon the ventilation and means of purification resorted to during illness as well as during convalescence, and upon the care taken with his clothes and person. Amongst the lower classes, infection probably continues longer to attach itself to the person than the period now named, owing to circumstances peculiar to them; and there is every reason to believe that it may continue in their apartments or dwellings even weeks and months afterwards, unless disinfecting means be carefully employed.

60. *B.* In many situations, and in several distempers, *the chances of infection by fomites* are much greater than by communication with the sick. — Articles of bedding, feathers, furs, body-clothes, &c., which have imbibed the effluvium of the affected, readily transmit most of the infectious diseases of this country, as well as the pestilential maladies of other countries, to very distant parts. It is astonishing, how long woollen and silken bed and body-clothes will retain the effluvium, so as to affect the healthy by it, when closely packed together, or excluded from ventilation. The animal miasm, which the clothes worn in dissecting rooms have imbibed, will be sensibly perceived many months afterwards, if they have been put in a close place, immediately after they were saturated with the foul air. The necessity of subjecting these articles to ablution, to free ventilation, and to other means of purification, is sufficiently obvious; but, by the lower classes, and even by other persons, all precautionary measures, even those which merely consist of common cleanliness, are most flagitiously neglected, although amongst them those measures are the most requisite. The crowded, low, close, and dirty state of their apartments, and the neglect of ventilation by them in all circumstances, and especially during disease, demand a stricter enforcement of purification, or disinfection, amongst them than elsewhere. Before articles from them or other infected sources are introduced amongst healthy predisposed persons, they should be subjected to the disinfecting agents about to be noticed; and to the perflation of the air in suitable situations, or in places from which the public are excluded.

61. *C. Disinfection.*—During the continuance of an infectious malady in a family or place, it is the duty of the inmates of the one, and of the authorities of the other, to put in force certain *measures of disinfection;* particularly when, owing to the general prevalence or nature of the malady, it may not be deemed requisite to remove the sick to places suitable for their seclusion and treatment. In all circumstances, however, disinfecting means should be employed, as tending, not only to protect the healthy, but also to aid the infected. For it is obvious, that it is much to the advantage of the latter to have the air and clothes, in which they are confined, frequently renewed, and the morbid effluvium removed or counteracted, than to be subject to its concentrated influence during the course of the malady. To dilute, therefore, or to destroy, the infections floating in the air, or attached to any other medium, is a duty we owe both to the sick and to the healthy.

62. *a.* Amongst disinfecting means, a *perflation of pure dry air,* and the abstraction of all sources of humidity, are the most universally beneficial and applicable. These alone prevent several maladies, particularly those which proceed from the sources of infection, ranged under the first and second classes of these agents (§ 4.), from propagating themselves; and when they can be fully enforced, they prevent the extension of most of those distempers, which always proceed from specific infection and contagion. Whatever may be the sources of the morbid effluvium or emanation, dilution by a free ventilation will either weaken or destroy it—at least, so far as to cause it to fail to produce its usual effects. This result will be more certainly obtained when the air is dry. High ranges of temperature, by increasing the humidity of the atmosphere, favour infection, if a very free ventilation is not preserved; and cold, although preventing infection when there is a free circulation of air, often also promotes it, owing to the means used to prevent currents of cold air. This is frequently evinced by the evolution or propagation of infectious diseases in the close wards of hospitals and other places, during winter and spring.

63. *b. Various means* have been resorted to for *the destruction* or *neutralisation of infectious emanations,* especially during the prevalence of destructive epidemics or pestilences. In the desire to establish the efficacy of recently introduced disinfectants, the older means have been undeservedly depreciated. Although the former are the most efficacious, yet it follows not that the latter were devoid of all disinfecting powers. The advantages derived in former times from *fumigations* by camphor, benzoin, myrrh, tar, and terebinthinate substances, and by numerous aromatic, fragrant, and stimulating drugs, were owing to more than one circumstance. These means not only inspired those who used them with confidence, but also in some measure neutralised the operation of the infectious emanation. The fumes from them, and from other exciting and fragrant substances, often counteracted the impression made by the morbid emanation upon the nervous system, by preventing the depression it would otherwise have produced. On this account they may still be resorted to with advantage in some circumstances, particularly in cases of casual or short exposure to infectious emanations, or when it is desired to counteract those which are the less virulent and not generally diffused. When judiciously employed, many of these substances aid the recovery of the sick, especially when the disease is attended by much depression of vital power. Until the discovery of Labarracque's disinfecting fluid, and of the uses of the chloride of lime, they were the chief means that could be employed in the chambers of the sick; those which are next to be noticed, being, from their acrimony, suited chiefly to uninhabited houses.

64. *c. Acids* have long been in use as disinfecting agents, under the impression that they possess the property of decomposing infectious

emanations, or at least of diminishing their virulence. With this idea, the once popular nostrum, well known under the name of "*Thieves' vinegar*," was brought into notice, and even at the present day, under the name of "*Aromatic vinegar*," it is much used by persons exposed to infection, and, I believe, often with advantage. Letters and papers brought from an infected locality are not infrequently dipped in *vinegar*; while clothes and other fomites, transmitted from a similar source of infection, are exposed to the fumes arising from the slow combustion of sulphur, or, in other words, to the action of *sulphurous acid*; but as this latter is found to be injurious to the respiratory organs, and as the powers of the former are too weak to be relied upon when acids are indicated for the purpose of disinfection, the *nitrous* and the *hydrochloric* are those principally used, although not without some risk to the inhabitants of the apartments subjected to their action.—*Nitrous acid* was first employed by Dr. JOHNSTONE and Dr. CARMICHAEL SMYTH. The latter, however, obtained the parliamentary grant for the disputed discovery; and, in 1780, employed this acid to arrest the progress of a fever which was then raging at Winchester, among the Spanish prisoners confined in that city; and subsequently, numerous ships and hospitals, which had become the seat of infection, were exposed to the same agent with success. It may be easily obtained by the combination of nitre and sulphuric acid in proper proportions; and it possesses the advantage of not requiring the aid of heat to effect the development of its fumes.

65. *Hydrochloric acid* was introduced in 1773, by GUYTON MORVEAU, for the purpose of purifying the principal church at Dijon, the emanations from the crowded vaults below having so infected the air of the building, as to render it unfit for public service. This acid was soon afterwards employed with a similar intention in the prison of the same city; and its success in this case also served to establish its reputation. But the application of heat is necessary to procure the evolution of the fumes with rapidity, from the substances from which it is usually prepared. As its use is not without some danger to animal life, it is desirable that no heat should be applied when it is employed to disinfect inhabited apartments, and that the process should be allowed to go on slowly. But, however great may have been the reputation of both the nitrous and hydrochloric acids in times past, they are rarely used in the present day—both being compelled to yield to chlorine.

66. *d. Chlorine* was first brought into notice as a disinfecting agent by M. FOURCROY, in 1791; and was subsequently employed as such, on various occasions, by Mr. CRUIKSHANK of Woolwich, and by M. GUYTON MORVEAU. It has since been used by Dr. FARADAY for the purification of the Milbank Penitentiary; an account of which was published by this celebrated chemist, in the 18th volume of the *Journal of Sciences and the Arts*. Chlorine, for the purpose of fumigating, is most readily and usually obtained, as is well known, by mixing chloride of sodium and the peroxide of manganese, and adding to them a due proportion of sulphuric acid; but as it is extremely irritating to the membrane lining the bronchi and the air-cells of the lungs, when evolved in any considerable quantity, and as it is hence totally inapplicable to inhabited apartments or wards of hospitals, the above process is entirely unavailable on these occasions. To obviate this inconvenience, M. GUYTON MORVEAU introduced a very ingenious apparatus, by which the issue of gas could be regulated at pleasure: but this and all other processes have been altogether superseded by the introduction, by M. LABARRAQUE, of the *chloride of lime* and *chlorinated soda*. There has been, indeed, much discussion as to the chemical nature of these compounds, but this is a subject not requiring notice here; practically it is of far greater importance to know that they are most powerful disinfectants, and that their success has been unequivocal in the most varied cases wherein the use of these agents are indicated. M. LABARRAQUE recommends the *chloride of lime* as the substance best adapted for infected apartments, and considers the *chlorinated soda* as more applicable to foul wounds, ulcers, &c. Both these substances, however, possess the property of preventing infection or putrefaction, and of arresting it when it has commenced; and they may both be used with perfect safety in sick chambers, in the wards of hospitals, and in prisons and other inhabited places. When it is desired to purify any of these apartments, portions of linen, steeped in the solution, should be hung in various places about the room, and the floor and walls frequently and freely sprinkled with it. Some persons, however, with more nicety than discretion, object to the use of these substances, in consequence of the unpleasant odour of chlorine, which they declare to be equally or more offensive than that of the infectious effluvium; but it should be borne in mind, that the existence of the latter is pregnant with danger to those exposed to it, whilst, in the diffusion of chlorine by means of these liquids, there is nothing pernicious to life.

67. Besides cleansing the air, chlorine, and all other purifying fumigations, will have a similar effect on the various solid substances and articles of furniture in the infected apartment. It is prudent, however, in addition to the employment of the above measures, to wash these substances well with soap and water; and as soon as the patient can be removed, the walls of the apartment should be whitewashed, and the room be well and freely ventilated, prior to its being again inhabited. All bed and body clothes removed from a patient labouring under an infectious disorder, should be at once immersed in hot water, or in a solution of an alkaline ley; and after being soaked in either for a considerable time, they should be subsequently hung out in the open air, and occasionally sprinkled with the chlorinated solution. It must not be forgotten, that the beneficial effect of chlorine will be exerted only on a limited quantity of air, and that it is by no means sufficient to correct any epidemic taint existing in the atmosphere of a district or place. When employed, however, in a limited atmosphere, this, and other disinfectants, have proved of no small advantage in checking the spread of infectious maladies; but the power which they possess, is far from being sufficient to preclude the necessity of avoiding unnecessary exposure to the sources of contagion, and of adopting preventive and precautionary measures.

68. *e.* In addition to the forementioned means, an *elevated temperature* has been recommended by

Dr. HENRY, as a powerful means of disinfecting fomites, or substances imbued with infectious emanations. The effect of heat has been principally tried in cases of *typhus* and *scarlatina;* and although its power to destroy the infectious properties of the effluvia produced by typhus may be questioned, yet the experiments of Dr. HENRY prove that the emanations of *scarlatina* are decomposed or dissipated by exposure, for an hour at least, to a temperature of 200°. And it must be acknowledged that, where heat is of itself sufficient to exert a beneficial influence upon infected clothing and other fomites, it is preferable for this purpose to chlorine, or any other fumigation, being more easily and more extensively diffused throughout the whole of the substances conveying infection. Its use is, however, limited to bed and body clothes, to trunks and packages, and other articles capable of imbibing and retaining the morbid emanation.

69. IX. PRECAUTIONS AGAINST INFECTION.— Every rational measure to avoid exposure to the infectious effluvia, whether emanating immediately from the bodies of the affected, or mediately from other sources, should be resorted to. Under this head, as strict seclusion as possible, and shunning intercourse with those most likely to have been amongst the infected, are deserving of attention. The predisposing and concurrent causes of DISEASE (see the article, §23. *et seq.* 61.) should be carefully avoided. Whatever tends, directly or indirectly, to debilitate or fatigue the body—whatever lowers its vital energy, as excesses of every description, low and unwholesome diet, and insufficient clothing, disposes to the operation of the exciting causes of infectious maladies. On the other hand, whatever tends to support this energy, and preserve in their due regularity the healthy functions of the frame, serves to render it impregnable to infectious agents. Exposure to cold, to chills, to the night-dew, to wet, and moisture; the use of cold fluids, and of cold, flatulent, and unripe fruits; should be carefully avoided. If, at any time, exposure to the night-air or to cold and moisture is inevitable, the system should be fortified against them; but the mode of doing this requires caution. It should not be attempted, unless when better means are not within reach, by wines or spirits, and, even then, these should be used in very moderate quantity; otherwise they will leave the system, as soon as their stimulating effects have passed off, more exposed than before to the invasion of infectious effluvia. Medicinal tonics and restoratives, however,— and those more especially which determine the circulation to the surface of the body, at the same time that they improve the tone of the digestive organs, and promote the regular functions of the bowels and biliary system,—may be resorted to on such occasions. For this purpose the infusions or decoctions of bark, of cascarilla, of calumba, &c., with the spirits of Mindererus, or any warm stomachic medicine, or the powdered bark, or the sulphate of quinine, or the balsams, may be taken either alone or with camphor, or with the aloes and myrrh pill, and any one of the spicy aromatics. These medicinal means are especially called for, whenever an infectious malady, of which the individual is susceptible, is present in a town or house in which the person resides; and they should be had recourse to when he retires to sleep, and in the morning before he leaves his room. He should, moreover, avoid sleeping in low and ill-ventilated apartments; and be equally distrustful of sleeping near, or even of passing through in the night-time, close and unwholesome situations and streets, particularly without having resorted to the medicinal means now suggested. (See art. ENDEMIC INFLUENCES.)

70. Care should be taken never to be exposed to the morning or night air with an empty stomach. A cup or two of coffee, and bread, previous to such exposures, will be serviceable. The stomach and bowels should be always attended to, and their functions regulated and carefully assisted; but in no case should these objects be attempted by cold, debilitating medicines, such as sulphate of magnesia, or other saline purgatives. The warm stomachic laxatives, or those combined with tonics, may be adopted with advantage, as occasion may require.

71. Particular attention ought to be paid to *personal* and *domestic cleanliness.* The surface of the body should be kept in its natural and perspirable state. The constant use of flannel nearest the skin will be serviceable for this purpose. Excessive perspirations ought to be avoided.

72. The *diet* should be regular, moderate, nutritious, and easy of digestion. Whilst every approach to low living should be shunned, its opposite ought never to be indulged in. The stomach should have no more to do than what it can perfectly accomplish without fatigue to itself, but to the promotion of its own energies. It must never be roused to a state of injurious excitement by palatable excitants, nor weakened by over distention, or too copious draughts of cold relaxing diluents.

73. The *state of the mind* also requires judicious regulation. It ought never to be excited much above, nor lowered beneath, its usual tenour. The imagination must not be allowed for a moment to dwell upon the painful considerations which the disease is calculated to bring before the mind, and least of all ought the *dread* of it to be encouraged. There is a moral courage sometimes possessed by individuals who are the weakest, perhaps, as respects physical powers, enabling them to resist more efficiently the causes of infectious and epidemic diseases, than the bodily powers of the strongest, who are not endowed with this form of mental energy. Those who dread not attacks of diseases, and who yet exercise sufficient prudence in avoiding unnecessary exposure to their predisposing and exciting causes, may justly be considered as subject to comparatively little risk from them. On all occasions, however, a foolhardy contempt or neglect of ailments, especially those affecting the stomach and bowels, ought to be guarded against.

74. During the occurrence of infectious diseases in a family, these precautions are still more imperatively required. A free *ventilation* of every apartment ought to be constantly observed, in conjunction with *fumigations* by means of aromatic substances kept slowly burning, or by the vapours of chlorinated soda or chloride of lime. If a quantity of a very weak solution of chloride of lime be put in a vessel, and some hydrochloric acid be poured upon it, and be placed in the hall, or the very lowest parts in a house, the disengaged gas will soon find its way in sufficient quantity to the higher apartments. The attendants on the

sick should particularly observe the measures now prescribed; and ought never to exert their attentions on the affected, so near their persons as to inhale their breath, or the effluvium emanating from them, without at least fortifying the vital energies in the way pointed out; and they should carefully avoid entering upon those duties with an empty stomach, or when fatigued.

75. Besides burning warm aromatic substances, and odoriferous gum-resins, in the apartments, and in those adjoining them, in which affected persons are or have been confined, solutions of chlorinated soda, or of the chloride of lime, or a saturated solution of camphor in aromatic vinegar, or in the pyroligneous acid, should be occasionally sprinkled on the floors, furniture, and bed-clothes. These means, with a thorough ventilation, and a due attention to cleanliness, will not only counteract the influence of the effluvium proceeding from the affected, and ward off its action even on the predisposed, but will also prevent the clothes, bedding, or furniture of the apartments of the sick, and the clothes of the attendants, from becoming imbued with it, so as to communicate the malady. They are within the reach nearly of all; and in the event of the extension of a pestilential infection or epidemic to any considerable town or city, if care were taken to see them put in practice, under the direction of medical councils of health, one of which should be formed in each district or quarter, much good would result from them. Keeping in recollection the principle which I have endeavoured to establish, — that the excitingcause of infection undoubtedly makes the first impression on the nerves of the lungs, — the advantages of those measures, from the circumstance of their being applied especially to this organ, must be obvious.

76. When a contagious substance has been accidentally applied to a wounded or to an abraded part, means to prevent its absorption, or contaminating influence, should be instantly resorted to, appropriately to the situation, and to the nature of the contagious principle. Ligatures above the seat of injury, and suction of the part, should be instantly employed; and ablution with a strong acid solution, — with muriatic and nitric acids, or with both, — the application of spirits of turpentine, of the nitrate of silver in substance, or in a strong solution, and similar measures, ought subsequently to be adopted. In cases of the inoculation of the virus of *rabies*, excision of the injured part should precede these means, when it can be performed. At the same time, the promotion of the digestive functions and of the constitutional powers, by the treatment already advised, will materially aid the local applications in preventing the development of disease.

77. X. Treatment when Symptoms of Infection appear. — When a person has been exposed to the sources of infection, and particularly when the symptoms I have described, indicate that infection has actually taken place, and that the disease is in the course of development, *are* there any means which will prevent its evolution, or render its course more mild, if prevention cannot be accomplished? I believe that a treatment may be adopted, which will often succeed in preventing, or in mitigating, the disease; and that these ends will frequently be attained in respect of several infectious maladies. There are some, however, which cannot be arrested after infection has taken place, or after the symptoms characterising the formative or precursory stage have appeared. Small-pox, and probably plague, scarlet fever, and measles, seem to be the chief maladies which may not be prevented from developing themselves after infection has made the full morbid impression on the economy.

78. In order to arrest the progress of infection, it is necessary to keep in recollection the conclusions as to the operation of infectious agents on the system, that may reasonably be drawn from observations, both pathological and experimental. These conclusions, as furnishing a basis for remedial indications, may be limited to the following: — 1st. That the *more immediate impression* of infections is made upon the nervous system of organic life. — 2d. That this impression is of a sedative or *depressive* kind. — 3d. That infectious agents not only *depress*, but also *modify* or *alter* the vital influence in a special manner, or, in other words, each infectious agent produces a peculiar or specific depressing effect. — 4th. That the vascular system and circulating fluids soon experience the effects of this impression; and that the action of certain infections and contagions are earlier displayed on this system, in respect of some contagions, than as regards others. — 5th. That the circulating, secreted, and excreted fluids undergo a consecutive and progressive change. — 6th. That the impression on the organic nervous and vascular systems, and the consecutive changes in the fluids, ultimately affect and impair the vital constitution and cohesion of the soft solids. — 7th. That, as an infectious agent exerts a depressing or sedative, as well as a special or peculiar, morbid impression, it is reasonable to infer, that whatever tends to increase the nervous power, will enable the energies of life to resist the morbid impression, to prevent the progress of contamination, and often ultimately to remove both their immediate and remote effects.

79. Conformably with these views, I have, on numerous occasions of exposure to infectious agents, advised a *restorative* and *tonic treatment*, with strict attention to the *prophylactic means* just advised. These should be continued for a period at least equal, and in most cases beyond, that which is required for the development of the disease. In many instances, this treatment should be preceded by an *emetic*, which may be conjoined with some warm or stimulating substance. A warm *stomachic purgative* should afterwards be exhibited; and hot diluents, with camphorated or aromatic substances, may also be given. The energies of life ought to be promoted by means suited to the habits and circumstances of the individual, particularly by tonics or light nutritious diet, and pure dry air. When the infectious agent produces, at the period of exposure to it, a sensibly depressing and morbid operation, it will be often of service to excite, as soon as possible, an artificial febrile commotion in the system, and to promote the secretions and excretions. The excitement will overcome the depressing effects, and the promotion of the secretions and excretions will preserve the blood in an uncontaminated state. Much, however, will depend upon the employment of the means appropriately to the condition and circumstances of the infected person.

80. When the primary operation of infectious

agents is characterised by great vital depression, it is surprising how large doses of tonic and restorative substances may be taken before this state is removed. A lady of a delicate constitution, usually unable to take more than two glasses of wine after dinner, without occasioning heat and discomfort, was exposed to concentrated effluvia of the exanthematic typhus now prevalent. She felt an unpleasant odour, followed by a sudden loss of strength, nausea, and all the symptoms indicative of infection in a severe form. Her spirits were depressed; she stated her conviction that she had caught the infection, although she had approached it without any dread; gave directions as to her affairs, and resigned herself to her bed. I found her, with a weak, irregular pulse, slow and very compressible. The countenance was very pallid, and the mental and corporeal depression was extreme. — I prescribed camphor in the form of pill, and the decoction of cinchona with the compound tincture, the tincture of capsicum, the chlorate of potash, and carbonate of soda, in full and frequent doses. In the intervals, wine was given freely in the form of negus, a bottle being taken in the twenty-four hours in this form. These means were persisted in for two days, before the powers of life rallied; when a free and general perspiration broke out, and restoration quickly took place.

81. Of four persons who were exposed to the concentrated emanations of typhus, three of them were seen by me soon afterwards, owing to the appearance of symptoms of infection. They were all treated upon the same principles; sulphate of quinine and camphor in full doses, and as much purified extract of aloes as was necessary to keep the bowels open, were given every three or four hours, in two of these cases. The three, thus treated, soon ceased to experience the precursory symptoms. The fourth of these exposed persons was an aged female, and hence much less susceptible of typhus infection than the three young persons who had evidently caught the infection. She escaped, but carried the infection to her son and daughter. I might adduce numerous other proofs of the success of treatment during the period which elapses from exposure to infection, till the full evolution of its effects, if my limits could admit them. But I have advanced enough to show that appropriate means will often succeed in preventing the most severe and dangerous consequences, both to the person who has been exposed to infection, and to him who is experiencing its incipient or earlier effects. (*The above article is the substance of the Gulstonian Lectures, delivered by the Author at the Royal College of Physicians, in May*, 1838.)

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INFLAMMATION. — Syn. Φλόγωσις (from φλοξ, a flame), Φλεγμονὴ (from φλέγω, I burn), Φλέγμα, Φλέγμασια, Gr. *Inflammatio, Phlogosis, Phlegmone, Phlegmasia*, Lat. *Entzündung*, Germ. *Inflammation, Phlegmasie*, Fr. *Inflammazione*, Ital.

Classif. — 1. *Class*, Febrile Diseases; 2. *Order*, Inflammations (*Cullen*). 3. *Class*, Diseases of the Sanguineous Function; 2. *Order*, Inflammations (*Good*). III. Class, I. Order (*Author*, in *Preface*).

1. Defin. *Alteration of the vital actions of a part, manifested by morbid sensibility or pain, by redness, increased temperature, and swelling, generally with more or less febrile commotion of the system.*

2. *Inflammations* or *phlegmasiæ* constitute one one of the most numerous classes of disease, and appear the most frequently in practice. They are the most common sources of structural lesions, whilst they are, in their developed states, them-

selves lesions of organisation, yet originating in changes which are not at first, although they rapidly become more and more, manifest. They are thus intermediate states between disordered vital action, and change of structure; retaining, however, the characteristics of the former condition, even when they have superinduced the latter. They may be seated in any organ of the body, and in any tissue, excepting the cuticle, hair, and nails; but certain structures or parts are much more frequently affected by them than others. The phenomena characterising inflammations; the changes in the circulating and secreted fluids attending them; the effects produced by them locally and constitutionally; the remarkable variations these effects present, with the state of the system, and with the exciting causes; and the almost universal liability of the tissues and organs to their invasion; combine to impart the utmost interest and importance to the investigation of their *nature* and *treatment*.

3. In treating of this subject, I shall describe — *First, the phenomena, local and general, constituting inflammation of a sthenic form*, or as observed in a previously healthy person, with *their course, and terminations*, or consequences; — *Secondly, the varieties or states inflammation assumes*, owing to certain predisposing, exciting, and concurrent causes, to the previous condition of the patient; to morbid associations; and to the tissues affected; — *Thirdly, the causes, and pathology, or rational theory, of inflammation*; — and, *Fourthly, the treatment*, with reference to the different forms, states, and complications of the disease. Under one or other of these heads, I hope appropriately to introduce every thing of importance connected with the *causes, nature*, and *treatment* of this most important, most common, and but imperfectly understood, deviation from the healthy state.

4. I. OF THE PHENOMENA CONSTITUTING STHENIC INFLAMMATION, AND OF THEIR COURSE AND TERMINATIONS.—It is necessary, in order to form a satisfactory view of inflammation, to consider first, its phenomena, as manifested in a previously healthy constitution. It then presents characters which have been variously denominated, in order to distinguish them from those which attend inflammation occurring in previously disordered frames, as the *adhesive, phlegmonous, healthy, reparative, sthenic*, &c. — I have preferred the last of these terms, as it is more appropriate to most of the states in which this species of the disease presents itself. As *sthenic inflammation* occurs both in acute or active, and in slighter or more chronic forms, I shall describe it accordingly, but with due reference, to the succession of one to the other, — to the usual procession of the morbid phenomena of each, — to the effects upon the circulation and secretions, and to the ultimate results.

5. i. OF ACUTE STHENIC INFLAMMATION. — *A. Local Characters.* — In this, which may be denominated the truest or the most unequivocal form of inflammation, there is an *increase of the vital actions*; but this increase must be of a certain duration, and the vital actions must be altered in character as well as in degree — must be truly *morbid* — as I have contended in the article DISEASE (§ 87. *et seq.*), to constitute inflammation, and to distinguish it from the vital turgescence which is temporarily produced by local stimuli, or even by mental excitement. The true seat of inflammation is always the ganglionic nervous system and the capillary vessels of the part affected; the primary change, as will hereafter be more fully shown, originating with the former, but more fully expressed in the latter, constituent of the organisation.*

6. *Acute sthenic inflammation* commences with increased or *altered sensibility or pain* of the part, to which soon succeeds *redness*, from increased vascularity — from the enlargement of vessels. The *temperature* of the part is raised, the *functions* disturbed, the *secretions* at first interrupted, and subsequently changed; and swelling takes place. These phenomena are always present in a more or less remarkable manner, or in different proportions, and are much augmented when the system sympathises, and febrile action is developed. Neither of these constitutes inflammation when existing singly; and but four of them have generally been considered requisite to its existence, namely, *pain, redness, heat*, and *swelling*. *Disturbance*, however, *of the functions* and *disorder of the secretions* of the part, are constantly present, and are as much constituents of the disease as are those more generally conceded to it. To these, *the local symptoms*, it will be necessary more particularly to advert, before the *constitutional disorder*, consequent upon the local affection, is considered.

7. *a. Uneasy sensation, from its lowest grade, until it amounts to acute pain*, is the primary symptom following the operation of the exciting cause, or characterises that kind of excitement, or deranged influence of the ganglionic nerves forming the first series of the changes in the affected part, and it is heightened or kept up by the alteration thereby induced in the action of the capillaries. When the uneasy sensation amounts to pain, it is owing either to the degree of change in the organic nervous fibrillæ, or to the communication of the morbid excitement, originating in these nerves, to the terminations of the cerebro-spinal nerves, with which they are associated in the tissues. The pain, therefore, of inflammation originates in, or arises from, a change in the state of the particular influence exerted by the organic nervous fibrillæ of the part; this change deranging the action of the capillaries supplied by these fibrillæ, and often exciting or otherwise disturbing the sensibility of the associated cerebro-spinal nerves. That the extension, however, of the morbid change to the latter nerves is merely contingent, is shown by the slightness of the pain, or by the absence of acute pain in many cases of severe inflammation of internal viscera, particularly those which are not supplied by these nerves; and that the morbid sensation originates in the organic or ganglial nerves, and not in the cerebro-spinal, is rendered probable by the circumstance of the most acute pains which are clearly referable to the latter class of nerves, as those of neuralgia, trismus, and other spasmodic affections, not being attended by inflammation.

8. The *uneasy sensation* is the sensible mani-

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* I may here state, that this and other views connected with the pathology of inflammation were published by me, first in 1815, and subsequently in 1820, 1822, and 1824, in the works referred to in the Bibliography. It is the more necessary to state this, as several of these views have been adopted by later writers, and brought forward with an air of originality to which they have no claims.

festation of the primary change in the organic nerves of the part, — of that change, which induces the vital expansion, or turgescence of the capillary vessels, and the consequent increased influx of blood. The morbid sensation is afterwards increased to *actual pain* by the circumstances just stated (§ 7.), and by the excessive expansion and tension taking place in that part. It differs in severity and character according to the degree of inflammation, and to the sensibility and structure of the affected part. It often consists of soreness or aching, — of pricking, itching, tickling, tension, heat, or burning, — of painful throbbing, tearing, darting, gnawing, &c.; and in parts abundantly supplied with nerves, particularly with the nerves of sensation, it is most acute. In mucous, cellular, and parenchymatous structures, the pain is rarely very severe. The substance of the brain, or of the lungs, or of the liver, or of the kidneys, is often acutely inflamed without sensibility being materially excited. Severe pain in these diseases is owing either to the extension of inflammation to the serous or fibrous structures, or to the tension of these tissues caused by the swelling of the parts they inclose. Unyielding and dense textures, as the fibrous, serous, and fibro-cartilaginous, are generally the most painful when acutely inflamed. — Pain does not always represent the true seat of the disease. In cases of partial inflammation of the substance of the brain, pain may be felt only in some remote part of a limb, or in a part of the scalp. During inflammation of the substance either of the lungs, or of the liver, or of the kidneys, or of the uterus, pain may be felt only in those ramifications of the cerebro-spinal nerves, which are most intimately related to the organic nerves of the affected part, as in the vicinity of the clavicle or shoulders, in the limbs, &c.

9. It is necessary to study, not only the severity and character of pain, with reference to the existence of inflammation, but also its types or modes. The uneasy sensation attending inflammation is generally constant; and, although often exasperated at times, it is never altogether absent. Even when no pain is complained of, as often occurs in inflammations of internal viscera, tenderness to the touch, or to pressure, is generally present. When, with continued pain, or with a sense of soreness, aching, or of throbbing synchronous with the pulse, or of heat, more or less constant, there are tenderness on pressure, and increase of the morbid sensation on exercising the functions of the part, inflammation may be inferred, even when other indications of it are absent. But the most severe pains, without tenderness, or with perfect tolerance of pressure, and especially if they are paroxysmal, and attended by complete intermissions, furnish no evidence of inflammation.

10. *b. Redness*, of itself, is not sufficient to indicate inflammation. It may arise from active congestion of the capillaries, or from a vital turgescence of only temporary duration. On the application of an irritant, redness of the part is not manifested immediately, although uneasy sensation is induced; but it soon is developed owing to the morbid excitement of the nervous fibrillæ, and like this morbid state, it is more or less permanent. The redness which has thus arisen is caused by the vital expansion of the capillaries, and by the admission of a larger current of blood into them, and of the colouring globules into a series of vessels which did not formerly admit them. The blood also, during the sthenic state of inflammation, becomes somewhat more florid than usual, in the capillary vessels. The redness is generally greatest in the centre of the inflamed part, or in that spot in which the irritation originated; but it spreads more or less, and is gradually lost in the surrounding tissues. The colour varies in depth or hue with the progress and form of inflammation; but, in the species now being considered, it is more or less florid or deep. In very vascular, or highly organised parts, the tint is deepest, owing to the more intense state of action.

11. Increased redness of a part may exist, as just stated, without inflammation. In order to impart to it essentially inflammatory characters, the vascular action from which the redness proceeds must not only be excited, but also otherwise changed from the healthy state. It must be rendered truly morbid. Stimuli or mental emotions will produce redness, but this redness is not inflammatory; it soon disappears, and gives rise to no consequences or lesions. The excitant or irritant must, from either its continued or its peculiar action, change or vitiate, as well as excite, the organic nerves of the part,—must impart to them a *truly morbid state* or influence, which similarly effects the vital actions of the capillaries, not merely exciting, but also modifying, that action, so as to give rise to effects very different from those observed in health. In this respect, chiefly, the redness of inflammation differs from simple vascular excitement, or injection or congestion. In this latter state, the vessels are distended, and contain more than their usual quantity of blood, the circulation through them varying in activity, — either rising above, or sinking below, the common grade of celerity. This state, to which only the very loose and often inappropriately employed term, *hyperæmia*, recently introduced into pathological discussions, is applicable, is, however, very different from true inflammation, although it may be readily converted into some one of the varieties of inflammation. It is unattended by that morbid state of the organic nerves of the part, upon which the true inflammatory action of the capillaries depends. However denominated, whether *congestion* or *hyperæmia* — or however qualified by the prefix *active* or *passive*, it forms no essential part, and constitutes no particular stage, of sthenic inflammation, as supposed by some recent writers.

12. If we trace *the course* of the vascular disturbance, we shall find that a contraction of the capillaries of the part follows upon the application of an irritant, and upon the change produced in the organic nerves of the part. The contraction is soon followed by a reaction or vital expansion of these vessels, an increased afflux of blood, and the other phenomena of the excited vital process. The veins receive the blood from the minutest ramifications of the capillaries, in such a manner as naturally to retard the capillary circulation in them. Consequently, when the action of the capillaries is morbidly increased, expansion of these vessels, and an excessive accumulation of blood in them, must necessarily follow; for the veins are incapable of receiving, and carrying onwards with sufficient rapidity, the quantity of blood sent to them. Owing to this circumstance, vessels pre-

viously admitting only the colourless blood, become expanded, so as to admit the red globules; and as the morbid process goes on, new vessels are probably developed; the blood also becoming, and continuing to be, more florid, as long as the sthenic action persists.

13. *c. Increased heat*, as well as augmented redness, is the result of the morbidly excited action. Experiments, however, with the thermometer, show that the warmth of inflamed parts is not so great as the sensations usually indicate.— Some writers, as HUNTER, ABERNETHY, MAYO, and others, contend, there is actually no increase of the temperature above the healthy standard; but such is not the case. The temperature of an inflamed part upon, or near the surface, is usually several degrees higher than that of parts at some distance from it; and even the deep-seated viscera experience a rise of two or three degrees, and often much more, above the healthy temperature of 98°. The existence of heat, even with increased redness, is not an unequivocal symptom of inflammation; for it may depend upon temporary or healthy excitement merely. It is necessary to be continued to indicate a morbid state of action. Moreover, it may be so slightly augmented as to escape notice.

14. As to *the source* of heat in inflamed parts, some difference of opinion has existed.— Since CRAWFORD proposed the theory of the dependence of animal heat upon the different capacities of venous and arterial blood for caloric, the warmth of these parts has been imputed by many to the quantity of blood circulating through them, and passing from the arterial to the venous state. Without occupying my limits with the opinions and discussions as to animal heat, I may remark, that Sir B. BRODIE considered, from his experiments, that the cerebro-spinal nervous system was instrumental in its production. This opinion, however, was not confirmed by the researches of LEGALLOIS, W. PHILIP, and HASTINGS. In 1820, 1822, and 1824, I published my views on the subject (see *Lond. Med. Repos.* vol. xvii. p. 370., and *Appendix* to RICHERAND's *Elements of Physiology*, p. 630.), and contended that animal heat is not the result of the difference of capacity existing between venous and arterial blood; for, as Dr. DAVY has shown, this difference is not sufficient to explain the phenomenon, although it may be subordinately concerned in producing it. I then stated, that the various causes, which modify the production of animal heat act — 1st, immediately upon the organic system of nerves; — 2dly, upon the blood; — and, 3dly, through the medium of the cerebro-spinal system, modifying the influence which this system imparts to the ganglial. I then viewed animal heat more as a vital secretion than as a chemical phenomenon, — as proceeding from, and as being controlled by, the influence exerted by the ganglial system of nerves upon the vascular system and blood; and the subsequent researches of CHOSSAT and EDWARDS obviously confirm this opinion. Conformably with this view, I have stated, in the works referred to, that the increased heat of inflammation is derived from the same source, —from the influence of the organic nerves upon the vessels of the affected part, aided by the increased circulation through the capillaries; the nervous influence enlarging these vessels, or occasioning an erectile state of them, and thereby soliciting an afflux of blood to the part. The increased temperature of erectile tissues, consequent upon irritation of their nerves and expansion of their vessels, fully illustrates this theory of animal heat, and particularly with reference to inflammation.

15. *d. Swelling* has been assigned above as one of the changes constituting inflammation. But, from what I have already stated, it should be viewed rather as a consequence of this act, than as an essential part of it. Besides, swelling is not always present, owing to circumstances about to be noticed. The morbid state of the organic nerves and the expansion of the capillaries are the earliest causes of swelling. But, as the diseased action proceeds, a more or less copious exudation of serum into the areolar tissue takes place; a portion of the serum and even of the red particles of the blood passes through the pores or distended walls of the capillary canals, especially in cellular or mucous tissues, distending, tumifying, and thickening the inflamed part. Hence the areolæ of cellular structures are found filled with a serous, sero-albuminous, and often with a sanguineous fluid, in which flocculi are sometimes seen floating, or adhering to the parietes of the areolæ or cells; these parietes being often thickened.

16. The *nature* of the swelling entirely depends upon the state or kind of fluid thus exuded from the inflamed capillaries.—The *state* of the fluid depends upon the kind of disorder of the organic nervous influence of the part, and of the constitution generally, and upon the degree of vital power exerted by the system. — In the *sthenic species* of inflammation, this power, however much it may deviate from the healthy condition, is at least not depressed below this condition. The fluid exuded is therefore a product of increased or sthenic vascular action, excited and kept up by the influence exerted on the capillaries by the nerves in which the disorder originated. Hence it is generally sero-albuminous, or a mixture of serum and coagulating lymph, sometimes containing colouring particles when the morbid action is intense; and the consequent swelling is firm, tense, and limited as to extent. The sero-albuminous or coagulating character of the effused fluid entirely depends upon the sthenic nature of the inflammation, and is of the utmost importance as respects the subsequent changes. When the organic nervous or vital power, locally or generally, is depressed, or otherwise vitiated as well as depressed, the effused fluid is not albuminous, and does not coagulate. It is then either serous, or sanguineous, or even sanious; and does not possess the characters of coagulable lymph. The consequent swelling is œdematous, soft, diffusive, or spreading, owing to the fluid state of the exudation, and its more ready infiltration into the surrounding parts. Whilst organic nervous or vital power is unreduced, the exuded matter occasioning the swelling in the advanced stage of inflammation, at least partially coagulates, and limits the extension of tumefaction. But when this power is much reduced, or greatly vitiated, as in the different forms of *asthenic* inflammation, this matter retains its fluidity, infiltrating and infecting the surrounding tissues.

17. The existence and amount of swelling chiefly depends upon the nature of the inflamed tissue. It is neither so early nor so obviously present in inflammation of dense structures, as in

that of soft and yielding parts. It is inconsiderable in fibrous, fibro-cartilaginous, and serous tissues, and is hardly apparent until the morbid action has continued for some time. In cellular, mucous, and parenchymatous tissues, the swelling is early and considerable. In certain parts, as in cellular tissue bound down by aponeurotic expansions, and in the internal structure of organs surrounded by fibrous or unyielding membranes, the swelling is less, or more slowly developed; the pressure thus occasioned restraining the effusion and the expansion of the capillaries. But, where the morbid action is intense, the pressure gives rise to a most distressing sense of tension, interrupts the functions of the organ, and sometimes even the circulation in it, thereby destroying its vitality and occasioning dissolution. When the substance of the brain is inflamed, the nature of its circulation, the great division and tenuity of its capillaries, and the unyielding nature of its surrounding structures, combine to prevent it from becoming much swollen. Yet there is every reason to believe that more or less swelling actually occurs (see art. APOPLEXY, and BRAIN —*Inflammation of*), and that the pressure on the inflamed organ, occasioned by the unyielding parts surrounding it, gives rise to the more dangerous symptoms observed in the advanced progress of the disease.

18. *e.* The *functions* of an inflamed organ, tissue, or part, are, as Mr. MORGAN has very justly contended, more or less disordered; and I may add, that the disorder is one of the earliest phenomena or constituents of the morbid action, being nearly coëtaneous with the change in the organic nervous power, on which this action depends. The disturbance of the functions is generally in proportion to the violence of the disease. If the inflamed part performs a secreting function, the secretion is either diminished, increased, or altered in character. — *Diminution* of this function is observed, when the cutaneous surface is inflamed, at the commencement of acute inflammation of serous and mucous membranes, and when the morbid action in glandular secreting organs is sudden or intense. When parts near the surface are inflamed, perspiration is obstructed, and the temperature is thereby increased. It is only at the commencement of inflammatory action in serous and mucous surfaces, that their secretions are diminished: as the disease proceeds, their secretions become increased, but at the same time changed in their characters; the change varying with the intensity, form, and duration of morbid action, and with the state of the patient. Inflammation of glandular organs is generally attended by suspension or diminution of their secretions, as in hepatitis, nephritis, &c. But in many cases, one kidney only, or a portion of the liver, may be inflamed, the secretion being only diminished or somewhat altered. It should, however, be recollected, that the secretions of an organ may be suspended, increased, or morbidly affected, otherwise than by inflammatory action.

19. The lesion of function attending the commencement of inflammation obviously depends upon the primary affection of the organic nerves. That accompanying the advanced progress of the morbid action proceeds not only from this source, but also from the alteration in the capillary circulation, from the consequent effusion of lymph in the inflamed tissue, and from the swelling and mechanical obstruction thereby produced.

20. The *throbbing* is connected with the obstruction to the return of blood, particularly from the expanded capillaries, into the veins. It is synchronous with the pulse, and is caused by the injection of blood into the part on each contraction of the left ventricle of the heart. It increases and renders the pain pulsatile; when it occurs at an advanced stage of inflammation, it is usually soon followed by suppuration. It is increased by a depending position of the inflamed part, and by whatever either obstructs the return of blood from, or favours the flow of it to, the seat of disease.

21. *B.* OF THE LOCAL APPEARANCES AFTER DEATH. — Certain of the preceding local characters of inflammation necessarily disappear with the termination of life; and the rest, as redness and swelling, either vanish, or remain for some time afterwards.—*Redness* does not always continue after death; its absence, therefore, is no proof that inflammation had not existed during life. Its presence also, *post mortem*, is not sufficient evidence of its dependence upon this cause. At an early stage of inflammation, and before the capillaries have lost their vital tone or contractility, and before much serum or lymph has been effused, redness generally disappears after death. Even when much effusion of fluid, and other changes consequent upon the morbid vascular action, have taken place, the blood may have entirely forsaken the vessels before the parts have been examined. Where redness actually exists, much discrimination is necessary to determine, whether or not it has proceeded from inflammation, or from a dependent position, or from transudation of the colouring matter of the blood from the vessels, or from incipient decomposition. It may arise from either of these. In many cases, two or more combine to produce it: a depending position favours both the gravitation of the fluids in the vessels, and the exudation of the colouring particles in the lower parts. The injection caused by position more readily occurs in parts which have been inflamed, than in those previously sound. Much, however, depends upon the seat and form of inflammation, and upon the circumstances connected with dissolution. Next to position, obstructed circulation through the heart or lungs, or obstruction to the return of blood in the veins, most frequently occasions non-inflammatory injection and redness, particularly in mucous surfaces; but, in such instances, the redness is more or less general or diffused in these parts, or exists in situations remote from each other, and is not attended by the usual products of inflammation. Attention to the circumstances causing redness of parts after death will generally enable the practitioner to infer with accuracy its dependence upon inflammation. When it is associated with any of the usual products or consequences of this disease, as the effusion of lymph, or of a sero-albuminous fluid, with softening, swelling, &c., then no doubt as to its origin need be entertained. (See *Diagnosis.*)

22. *C.* OF THE CONSTITUTIONAL SYMPTOMS OR EFFECTS OF STHENIC INFLAMMATION. — The constitutional phenomena vary remarkably with the exciting causes, the intensity, and the seat of inflammation; and they are further modified by age, habit of body, diathesis, and epidemic constitution.—When inflammatory action takes place in

a previously healthy person, and from causes which do not materially vitiate or depress the vital powers, or contaminate the circulating fluids, the constitutional effect presents certain features which are rarely wanting. It has been variously denominated, as *Symptomatic Inflammatory Fever*; —*Sympathetic Synocha*;—*General vascular Reaction*; — *Inflammatory Fever*, &c.; and has been improperly described in connection with, or rather as a species of, true fever. Indeed, some writers, as I have shown in the article FEVER (§ 91.), particularly CLUTTERBUCK, MARCUS, and BROUSSAIS, have contended that the *constitutional affection*, produced by the local changes constituting inflammation, is in no respects different from *idiopathic fever*. In the article just referred to, I have stated sufficient to prove the very remarkable differences between the two (§ 26—30.); and I shall hereafter succinctly notice the subject. Indeed, the former is altogether distinct from the latter, and should not be considered in connection with it, further than to point out the diagnosis.

23. In some constitutions, particularly the sanguineous, the irritable, and the nervous, the local lesions described above (§ 6.), very soon after their commencement, create more or less constitutional disturbance and febrile commotion; whilst in others, as the phlegmatic or lymphatic, the melancholic or bilious, these lesions may have been of some continuance, or have proceeded far, before general disorder is developed, or becomes severe. The local change being the same, the constitutional effect will vary remarkably in grade, form, and course, according to these and other circumstances just mentioned. In some, it will be rapidly developed; in others, slowly, or after a precursory period of longer or shorter duration, or after several efforts to produce it. The earlier constitutional symptoms are often neglected by the patient, and are seldom subjected to the physician. Occasionally the patient experiences chills or rigors more or less severe, almost immediately after sensations of pain or uneasiness. In rarer cases, morbid sensation is not produced, until either during, or after, the rigors. This is observed most frequently in inflammations of internal organs. More commonly the patient complains, in connection with pain, of uneasiness, or other morbid states of sensation referrible to a particular part, of weakness of the limbs, lassitude, general uneasiness, or lowness of spirits, of slight chills, formication, or of an alternation of slight chills and flushings. These may be the only precursors; or they may be attended by disturbed sleep, a whitish or loaded tongue, a clammy state of the mouth, with vitiated taste, want of appetite, constipation, &c. With these, the local symptoms are aggravated, and severe rigors or shudderings are more or less rapidly produced. The rigors are sometimes accompanied with nausea or vomiting. The countenance, general surface, and extremities, which were pale, harsh, or cold, during the rigors and chills, soon afterwards become warm; and the pulse, which was previously small or constricted, and but little accelerated, increases in quickness and volume. The consequent phenomena appear with a rapidity and severity, varying with the intensity and extent of the local action. The secretions and excretions are diminished, and subsequently vitiated. The skin is hot and burning, the face flushed; the tongue is white, furred, or loaded, and, with the mouth, somewhat dry or clammy; the appetite is gone; thirst is urgent; the bowels are constipated; the urine is scanty, high-coloured, clear, and emits a strong odour; and pains are often felt in the back, or loins, limbs, or head, in addition to those referred to the inflamed organ. The symptoms indicate general vascular excitement and its usual consequences, unconnected with depression of vital power, or contamination of the fluids. When they are severe or intense, and when the energies of life become exhausted, delirium sometimes takes place, particularly at night; but it rarely appears early, unless the brain is the seat of inflammation, or readily sympathises with the local affection, as in inflammation of the diaphragm or of fibrinous parts.

24. The acuteness of the general symptoms is not always in relation to the severity of the local changes; but, according to the intensity of either, or of both, will the type of the former be more manifestly continued. The less severe states of constitutional affection, and particularly when the local morbid action is neither extensive nor very acute, are characterised by exacerbations in the evening or night, during which the local symptoms are more or less exasperated; restlessness and want of sleep being generally present. In the morning the symptoms are ameliorated, and a tendency to perspiration appears. The course and duration of the constitutional affection vary with the severity and the seat of the local disease, and with the circumstances proper to the individual affected. The symptoms usually increase either gradually or rapidly, according to the nature of the exciting causes, the acuteness of the attack, and the circumstances just alluded to, until they arrive at a certain pitch or *acmé*, from which they decline more or less rapidly in some cases, and slowly in others. This change, whether taking place gradually and slowly, or suddenly and rapidly, depends entirely upon the state of the local affection. If the local symptoms gradually decline, the general disturbance subsides in a similar manner; and if any of the more unfavourable terminations of the local disease about to be noticed occurs, the system evinces the change, as will be hereafter stated.

25. *D.* OF THE CHANGES OBSERVED IN THE BLOOD IN STHENIC INFLAMMATION.— These vary remarkably with the circumstances determining the severity, seat, and course of the disease. I have described them so fully in the article BLOOD (§ 96. *et seq.*), that little more need be here adduced upon the subject.—Much importance has been attached to the existence of a *buffy coat*, and of a *cupped* appearance of the coagulum. These states of the blood are most frequently observed in the species of inflammation now being considered. But they are not always, nor even very generally, present, nor at all stages of the disease in which they occur. They are even more commonly met with in some complaints which, although nearly allied to inflammation, are not purely inflammatory, as rheumatism. They have frequently a marked reference to the stage and seat of inflammation. In acute rheumatism they are very remarkable, and often become more so as depletions are repeated. I once witnessed a case of the internal metastasis of rheumatism, for which venæsection was repeated several times. The buffed and cupped appearances became more and more remarkable; and yet, upon examination after death,

no signs of inflammation could be detected, and the internal viscera were quite bloodless. When, however, serous and fibrous structures are inflamed, these states of the coagulum very generally exist. During acute inflammation of cellular and mucous tissues, they are much less frequently observed. When compound or parenchymatous structures are inflamed, they are met with chiefly in certain stages and states of the disease. When an important or vital organ is inflamed, and especially when the patient is plethoric, and the circulation oppressed, these appearances often do not take place until the vascular load and oppression are removed, and the circulation is rendered free. There are various other circumstances which affect the state of the coagulum in acute sthenic inflammations, but they are noticed in the article just referred to. It is chiefly in the venous blood that *cupped* and *buffed* appearances have been seen; for the occasions of noticing them in arterial blood are comparatively rare and unfavourable to their occurrence. They have, however, been met with in arterial blood by GORDON, GENDRIN, and others.

26. *The coagulation of the blood*, and the origin of the buffy coat of the coagulum, have been so fully considered elsewhere (see art. BLOOD, and my *Appendix* to RICHERAND's *Elements of Physiology*, p. 638.), that I need adduce but little further on the subject, than to state the facts ascertained, and the inferences deduced, from my investigations, and published in 1824, in the first edition of the *Appendix* just mentioned. — The blood during life consists of serum, holding in suspension small regular and insoluble globules, each of which is composed of a central colourless spheroid corpuscle, and a coloured envelope. The latter always continues to surround the former during life; but, as life departs, and as the motion to which it gives rise ceases, the attraction between the central corpuscles and their coloured envelopes no longer exists, the one completely separating from the other. The central corpuscles then obey the force which tends to unite them, and form a network in whose meshes the liberated colouring matter, now detached from these corpuscles, becomes inclosed, and thus the coagulum is formed. These central corpuscles, in uniting into filaments, or other forms, constitute the fibrine, which, as respects its constitution, is probably only a modified or more highly animalised albumen, which abounds more or less in the serum. When the coagulum of the blood is exposed to a stream of water, the colouring matter, detached from the central corpuscles, is washed away, whilst the corpuscles themselves remain aggregated in the form of fibrinous filaments. It is the various forms assumed by the aggregation or mutual attraction of the central corpuscles, in relation to the separation, deposition, or entanglement of the colouring matter, and to the appearances of the serum in which these changes take place, which constitute the phenomena of coagulation, and give rise to the appearances of the blood characteristic of inflammatory action. In addition to these facts, the following *inferences*, as to the causes of the phenomena of coagulation, may be abridged from my notes above referred to: —

27. 1. The globules of the blood possess a rotatory motion during life, this motion continuing until shortly before coagulation takes place. — 2. This motion is the consequence chiefly of the organic nervous or vital influence which is exerted by the ganglionic system on the heart and blood-vessels, and which is partially imparted to the globules. — 3. This influence thus preserves the blood in a state of due fluidity. — 4. The fluidity of the blood is hence a vital phenomenon, or property *derived* from, and depending upon, the vital conditions of the vessels in which, and the organs through which, it circulates; the vital conditions of the vessels and organs depending, as shown elsewhere, chiefly upon the organic nervous influence. — 5. The cause of the *coagulation* of the blood is not to be found in external agencies, but in the loss of the vital influence and motion of the globules, proceeding from the sources just assigned — the power exerted by the ganglionic upon the vascular system. — 6. The presence of air, particularly the oxygenous portion of it, and several physical and chemical agents, hasten coagulation, whilst others delay or altogether prevent it. — 7. When coagulation commences at any point of a mass of blood, it is rapidly propagated throughout the whole: rest favouring coagulation; whilst motion delays or prevents it. — 8. The heat of the body and the strength of the circulation are not causes of the blood's fluidity, but are both results of the same cause, namely, the vital energy of the vessels, and vital endowment of the globules of the blood: both are co-ordinate; and both, as well as the phenomena connected with coagulation, are dependent on this source. — 9. Coagulation occurs sooner in venous than in arterial blood; and coagulation of arterial blood is still longer delayed if it be prevented from leaving the arteries. — 10. Coagulation takes place the sooner after the blood is removed from the vital sphere of the system, the weaker the vital energy to which it was subjected whilst circulating in the system. — 11. The weaker the vital energy, and consequently, the quicker the coagulation, the more lax is the coagulum which is formed. — 12. Coagulation is more slow, and the coagulum more firm, the more energetic the vital action of the vessels. — 13. As the central corpuscles lose their coloured envelopes soon after their removal beyond the sphere of the vital influence of the vessels, and as this is the first part of the act of coagulation following the loss of motion of the globules, so it may be inferred, that the colouring matter continues to surround the central corpuscles in consequence of the vitality emanating from the interior of the vessels and endowing the globules; and that the separation of the colouring envelope from the central corpuscle is the result of the loss of a portion or of the whole of that vitality, and of the rotatory (1.) motion which it occasions; and, as the loss of vitality may be reasonably supposed to be quickest where it has existed in the lowest grade, the separation of the coloured envelopes, and the attraction of the central corpuscles forming the fibrine, will be the quicker, the weaker the vital energy, and *vice versâ;* but the coagulum will be the more lax or imperfect, as shown by the facts already stated (10, 11.). — 14. Although the loss of the rotatory motion and of the colouring envelopes of the globules disposes the central corpuscles to attract each other, yet the attraction is weak in proportion to the depression of organic nervous or vital power endowing the vascular system at the time when the blood is abstracted; and in some inflamma-

tions, as well as in some other diseases, the depression may be so extreme as to deprive the central corpuscles of all power of uniting in the form of fibrinous filaments. In such cases, these corpuscles merely mix with the serum like a gelatinous or albuminous matter, and either suspend the colouring substance, or allow its deposition to the bottom of the vessel; the central corpuscles separating imperfectly from the serum or combining with its albumen, or forming merely an almost colourless gelatinous mass in the upper parts of the coagulum. — 15. The firmness of the coagulum is in proportion to the degree of organic nervous influence endowing the vascular system, and to the emanation which the globules themselves derive from this influence.

28. From what is now advanced, the appearances of the blood in inflammatory and other diseases will be readily explained. When the organic nervous power is depressed or exhausted — as in asthenic inflammations, in typhoid and adynamic fevers, in the true infectious puerperal fever, and puerperal mania, in the worst forms of erysipelas and diffusive inflammation of the cellular structures, and in several other diseases, particularly when epidemic, or occurring in hospitals, the air of which is vitiated by crowding of the sick, and the decomposition of the discharges and secretions, as in lying-in hospitals — the blood taken from a vein will often not separate into a distinct coagulum and serous fluid, but will assume the appearance either of a black, grumous, sanious, semi-gelatinous mass, or of a straw-coloured jelly, at the bottom of which jelly the colouring matter forms a loose reddish brown, or blackish, stratum. In such cases, the blood, participating in the deficiency of the vital energy of the body, and being also, perhaps, deranged from the admixture of hurtful materials with it, which are not duly eliminated by the various emunctories, evinces the lowest grades of vital endowment — the attraction between the central corpuscles of the globules being too weak to form a coagulum and to exclude the serum, the colouring envelopes separating speedily from the central corpuscles, and forming a loose stratum at the bottom of the vessel.

29. It may be inferred, as corollaries from the foregoing, that the appearances which the blood exhibits have always an intimate relation to the vital conditions of the system, and to the excitement of the heart and blood-vessels; that the buffy coat is merely one of the manifestations furnished by the blood, indicating reaction of the powers of life, or excitement of the vascular system; that the blood participates in the vitality of the body, through the medium of the vessels and organs in which it circulates; and that, according to the degree or condition of this vital endowment, coagulation and the coagulum are modified in their phenomena and appearances, and the production of the buffy coat promoted or altogether prevented. (See art. BLOOD, § 81. *et seq.*)

30. ii. OF CHRONIC INFLAMMATION. — Inflammation may affect any tissue or organ in so mild and obscure a form from the commencement, as to proceed for a long and indeterminate period; and, in many cases, to escape detection for a long time, owing to the slightness and gradual progress of the phenomena constituting the inflammatory act. This may be termed *Primary Chronic Inflammation.* The chronic form of inflammatory action is, however, frequently observed to follow the acute disease; the latter, owing to diathesis, treatment, premature exposure, and to the operation of injurious agents before recovery had taken place, only partially disappearing, or degenerating into a milder and more prolonged state of action. This state may be called *Consecutive Chronic Inflammation.*

31. *A.* The *Local Symptoms* vary remarkably with the mildness or severity of the morbid action; for, as the term *chronic*, as well as *acute*, is merely conventional or relative, both marking extremes of action, between which every intermediate grade is to be found, each of the phenomena already described, as characterising sthenic inflammatory action, appears in different states of development in different cases and circumstances. Generally speaking, however, all the local symptoms are much less severe than in the acute disease, and sometimes so slight as to escape detection. — *Pain* is occasionally absent, or is so slight as not to excite attention. — *Redness* is also sometimes slight, or not very remarkable. — The *temperature* is not much elevated: it is often not above the natural standard. — *Swelling* is frequently slight, but it is sometimes very considerable; and throbbing is seldom complained of. — The *functions* of the organ, or part affected, are generally more or less disordered; but in some instances the disorder is slight, or even escapes detection. This is especially the case when a portion only of an organ or part is chronically inflamed. When an internal organ is thus affected, it is chiefly by the presence of disordered function, and by the constitutional or sympathetic effects of the morbid action, that the nature and seat of the disease can be detected.

32. *B.* The *Constitutional Symptoms* are often slight and obscure, — sometimes prominent and characteristic. — *Febrile symptoms* are not always present; and even when most manifest, they are rarely of a continued type. They are generally remittent, or almost intermittent; the exacerbations being preceded by languor, uneasiness, or slight chills, followed by increased frequency of the pulse, by thirst, dryness of the mouth, and heat of skin. These symptoms come on in the evening, impair the rest, and subside in the morning, either with or without perspiration. The general health is more and more impaired, the strength fails, the flesh wastes, and the complexion waxes pale, sallow, or unhealthy. If the generative or urinary organs are the seat of the disease, various nervous or sympathetic symptoms are present; and if matter forms, or ulceration takes place, the chills become more severe, the febrile exacerbations terminate in copious perspirations; the urine is thick after standing, or deposits a sediment; emaciation proceeds more rapidly, and hectic fever is established.

33. iii. PROGRESS AND DURATION.—The progress and duration of sthenic inflammation are influenced by the constitution or diathesis, habits of life, age, and sex, of the patient; by the structure or organ affected; and by the treatment and influences to which the disease is subjected. The sanguine and irritable temperaments, a full and robust habit of body, and youth or the vigour of age, not only impart a sthenic character to inflammation, but also cause it to assume an acute or active form, or to run its course rapidly. A

similar effect is favoured by parts which are naturally vascular, and supplied abundantly with nerves, or endowed with high sensibility, and especially if they be placed near the centre of the circulation. On the other hand, the melancholic leucophlegmatic, and nervous temperaments, the scrofulous diathesis, an advanced period of life, and the female sex, prolong the progress of inflammatory action, and cause it to assume, either primarily or consecutively, a latent, languid, or mild and chronic, form. Structures endowed with little vascularity, and with a low grade of sensibility, as tendons, ligaments, fasciæ, and bones; also parts far removed from the centre of vitality and of circulation, as the extremities, are most prone to inflammation of a slow and chronic character.

34. The patient's habits of life have a remarkable influence in determining the character of inflammation from the commencement, — in favouring the passage of the acute into chronic disease, and in disposing the latter to assume the former state. Full living, and the use of much animal food, or of exciting and intoxicating liquors, have these effects especially, and not only prolong or aggravate the morbid action, but also cause its unfavourable termination. Similar results are also produced by injudicious treatment; by exposure to a close, miasmatous, foul, or unhealthy atmosphere; by certain epidemic constitutions of the air, depending upon electrical conditions, or other circumstances; by mental anxieties and perturbations, and improper or premature exercise or excitement of the functions of the part affected. These not only prolong or aggravate acute inflammation, but also render its terminations more unfavourable than they otherwise would have been; and cause slight or chronic inflammatory action to pass into the acute and active state.

35. The circumstances just alluded to render the *duration* of sthenic inflammations quite indeterminate. The active and acute states may continue but a short period, — but two or three days, or even not so long, until one or other of the terminations about to be described takes place; and the slight or chronic state may endure months, or even years. Between these extremes, every intermediate term of duration, as well as grade of action, may be seen. The duration depends chiefly upon the organ affected; acute inflammation in vital parts, especially the stomach and bowels, terminating most rapidly.

36. iv. The Complications of sthenic inflammations deserve some notice, although hitherto the subject has received no attention from pathological and practical writers, owing manifestly to the "*verba magistri*," the dictum of Hunter, — that two diseases cannot co-exist in the same frame. This, however, does not apply to inflammations, and hardly to other diseases, not excepting even specific contagions. The one morbid action may mask or absorb the other; but the one that predominates has its principal features somewhat modified by the association. In cases of chronic inflammation, particularly in females, and in young or nervous subjects, the sympathetic disturbance produced by it, will often attract the chief attention of the patient, and also of the physician; and a disease, truly depending upon inflammatory action, in some one of its grades, may be viewed as nervous, spasmodic, or functional. This most frequently applies to inflammations of the uterine and urinary organs, of the cerebro-spinal masses, and of the digestive mucous surface; and is fully illustrated in the articles Hysteria, Hypochondriasis, &c.

37. When a vital organ is inflamed, either acutely or chronically, other parts sympathise more or less; and when the inflammatory action is slight, the affected organ may not manifest the disorder by characteristic phenomena, the sympathising parts actually presenting the chief disturbance. Parts, also, which were at first only sympathetically affected in their functions or sensibility, may either, from the severity, or from the continuance, of such affection, become more and more seriously diseased, until the structure is changed; and thus, what was merely a symptom, increases to a morbid association; and, lastly, to a true complication; or even, ultimately, becomes the principal disease, the primary inflammation subsiding, or entirely disappearing, as the consecutive complication is developed. Instances of this are not infrequent in respect of inflammations of the lungs, pleura, pericardium, and heart; the disease originating in either, and extending to the others; the primary affection being masked by the consecutive disorder, and sometimes ultimately absorbed by it. Such occurrences still more frequently take place when any one of the abdominal viscera is inflamed; two or more of them becoming consecutively affected, the disease either continuing for a time to co-exist in them, or disappearing from the one as it is developed in the others.

38. The complication of inflammations with each other, or with nervous, spasmodic, or convulsive disorders, or even with hæmorrhage, is much more common than is usually supposed, — the latter often depending upon the former, particularly when the inflammation is chronic, slight, or latent. In such cases, the passage of the disease into a more acute or active form becomes an advantage, by disclosing its nature. Such complications are frequent in childhood, and in females, particularly during the puerperal states. Many of the convulsive affections of the former derive their origin, in a large proportion of cases, from inflammatory action; and most of the nervous, spasmodic, painful, and hysterical disorders of the latter, arise from inflammatory action of a slight and chronic form in the uterus, ovaria, or urinary organs.

39. v. Terminations and Consequences.—Inflammation, correctly speaking, terminates only in *two* ways: in *resolution*, or the recovery of the healthy state of action; and in *gangrene*, or the death of the inflamed part. The other morbid conditions, improperly ranked as terminations, are merely *consequences* of inflammation, the morbid vascular action giving rise to them, still subsisting in most instances, in some one or other of its forms. — *A.* When inflammatory action terminates in *resolution*, the phenomena subside very nearly in the order in which they appeared. Pain ceases; the redness and heat diminish; the swelling subsides gradually, and the functions slowly return. In many cases, however, the swelling continues with little diminution for a considerable time, and the functions of the part are restored with equal slowness; the recovery of the impaired tone of the capillary vessels, and the absorption of the sero-albuminous fluid effused in the areolæ of the tissues, being

necessary to the subsidence of the swelling, and to the restoration of function. This termination may be looked for when the inflammation does not proceed too rapidly; when the pains are neither acute, lancinating, nor throbbing; when the symptomatic fever gives rise to a general and copious perspiration; and when the urine deposits a sediment.—*B*. The termination of inflammation in *gangrene*, is so fully discussed in that article, that nothing further need be advanced respecting it at this place. (See art. GANGRENE, § 3. *et seq.*)

40. *C*. Of the *consequences* or *results* of inflammation, the most important are —*exudation*, *softening*, *suppuration*, *ulceration*, *induration*, *thickening*, and, probably, other organic changes. Several of these are treated of in separate articles; a simple reference to which, at this place, will be sufficient. — *a*. *Exudation* or *effusion* is the earliest and most common consequence of inflammatory action; the swelling, constituting one of the chief characters of inflammation, being caused by it chiefly. Exudation is the deposition, in the areolar tissue, in the parenchyma of an organ, in a cavity, or upon some surface, in consequence of excited vascular action, of a fluid consisting chiefly of the natural secretion of the part, greatly increased in quantity, and remarkably altered in its properties and appearances. This exudation sometimes commences at a comparatively early stage; but most commonly it becomes abundant at an advanced period, or even towards the close, of the morbid action; and it occasionally favours a resolution of this action, but not infrequently some degree of inflammation still subsists with it. The fluid which is exuded or effused, varies in its characters with the structure affected, and with the degree or activity of the morbid action producing it. Something also depends upon the function of absorption in the part; for when it is active, and the more fluid parts of the exudation are thus removed, the state of the remaining parts will be thereby much modified. Hence the fluid is serous, sero-albuminous, flocculent, turbid, liquid, thick or partially consistent, ropy or glairy, coagulated, adherent, albuminous, or even membranous or fibrinous.— The fluid exuded in inflamed cellular or parenchymatous structures is generally serous, turbid, sero-albuminous, or flocculent, but becoming more consistent, albuminous, or otherwise changed, as absorption proceeds. That which is exuded from inflamed serous surfaces is either fluid and transparent, or turbid and flocculent, or thick, semi-coagulated, and albuminous; films or layers of lymph, or of albuminous matter, covering the affected surface, or agglutinating opposite parts. The fluid exuded from mucous surfaces varies in different situations, and as the follicles, or the mucous membrane itself is principally affected. Hence the morbid secretion is watery or thin; or mucous, thick, and opaque; or glairy, ropy, gelatinous, and transparent; or muco-puriform, or sanguineous; or muco-albuminous, or consisting chiefly of an albuminous lymph.

41. The intensity or activity of inflammatory action influences, not only the quantity, but also the nature, of the effused fluid. When this action is weak or slight, the fluid is chiefly serous; and in proportion as it is more active or severe, the effusion is more albuminous, and presents the characters of coagulable lymph. But the effused fluid is also much modified by the constitution, diathesis, and habit of body of the patient, and by the vital and physical influences to which it is exposed for a time after its effusion. When the fluid is retained for some time in contact with surfaces which exuded it, the more watery portion is absorbed, and the albuminous part, or the lymph, becomes more plastic and solid, and, ultimately, even organised. This is shown especially in chronic and sub-acute inflammations of serous membranes. Even in mucous surfaces, as in the fauces, larynx, and trachea, the albuminous fluid exuded during inflammation is changed, not only by a partial absorption, but also by the evaporation, during the constant passage of the air over the parts during respiration. The scrofulous, the gouty, and the rheumatic diatheses further affect the quality of the fluids effused from inflamed surfaces; but still more depends upon the intensity of the general vascular disturbance, in connection with the state of vital power. When the former is energetic, and the latter unimpaired, then the effused fluid is albuminous, and abounds in coagulable lymph, a *formative*, as well as a *reparative*, process, frequently resulting therefrom; a formative process often appearing from inflammation of serous membranes, and a reparative process after the division or wounds of parts. When the febrile and vascular disturbance is great, and organic nervous or vital power is much impaired, the fluid effused is watery, sanious, turbid, septic, offensive, &c.; the morbid action being incapable of effusing a fluid sufficiently coagulable to be the medium of adhesion between opposing surfaces, or to limit the spread of the morbid action to surrounding parts. Hence inflammation, in these circumstances, assumes the asthenic, spreading, and disorganising characters about to be considered. One of the chief and most important features of sthenic inflammation is its disposition to exude a fluid more or less coagulable, by which parts adhere and unite, and which even becomes organised, and arrests the extension of the inflammation, as well as limits the destruction or disorganisation of the parts in which it commenced.

42. Albuminous or coagulable matter exists in the fluids effused or exuded by sthenic inflammation in various proportions. In the more liquid effusion, it is in small quantity, and is separated from the serum which suspends it, or holds it in solution, by heat and by the mineral acids; but of the more solid or consistent exudation, it constitutes the principal part. Between these extremes it is found in every proportion. In puriform matter and pure pus, albumen exists in the form of minute corpuscles, or globulus, swimming in a turbid serous fluid. In this, as well as in the more fluid states in which albumen presents itself, it is incapable of organisation; but, in the more solid or plastic state, it often becomes organised, and is the bond of union between divided parts, when the powers of the constitution, and the condition of the circulating fluids, admit of its production. Salutary or reparative effects, from the effusion of coagulable lymph, are evinced also by its effusion around *abscesses*, by its agglutinating serous membranes, when morbid formations, ulceration, and purulent matter are about to perforate them; and by its obliterating arteries or veins, after ligatures, or in circumstances where dangerous hæmorrhage

would otherwise occur. (See ABSCESS, and ADHESIONS.)

43. *b. Softening* is a very general consequence of inflammation, and one of the earliest which attends it. Indeed, inflammatory action seldom continues long, particularly in an acute form, without impairing more or less the vital cohesion of the tissues affected. It often precedes suppuration, and it generally increases the disposition to effusion. It is most remarkable in mucous and cellular parts, and in parenchymatous organs, particularly the brain, lungs, liver, &c.— these becoming more friable as well as softer, than natural. But softening from this, as well as from other morbid conditions, is fully considered in the *article* devoted to the subject.

44. *c. Suppuration* is the natural result of inflammation, when it is allowed to attain a high degree of intensity, especially in cellular, parenchymatous, and mucous structures. — *Pus*, the product of the suppurative act, is apparently produced from the albuminous part of the blood, by an altered state of the vital condition of the capillaries. It is very difficult to show satisfactorily in what this alteration consists; but it probably is impaired tone, or deficient vital contractility, of the capillary vessels, the arterial branches supplying them being still more or less excited. Suppuration may be viewed as a true act of secretion; although pus, as it usually appears, is somewhat changed in the course of its production by absorption, by the vitality of the parts with which it remains in contact, by temperature, and by evaporation. The small whitish flocculent masses often found in the purulent matter, consist chiefly of a more concrete albumen secreted by the inflamed part. Although suppuration chiefly takes place in the structures mentioned above, yet it sometimes is seen in other parts, especially in the cavities of joints, and more rarely in serous surfaces. In these situations, particularly in serous membranes, it is generally a result of intense action in connection with deficient power.

45. Mr. HUNTER was the first who recognised with any degree of accuracy the changes which take place in the blood, and in the capillaries of an inflamed part, during suppuration, inasmuch as he considered that pus was a remove further from the nature of the blood, than the matter formed by adhesive inflammation, — than coagulable lymph; and M. GENDRIN is of the same opinion. The formation of pus in an inflamed surface or tissue takes place as follows, according to the observations of KALTENBRUNNER, GENDRIN, CARSWELL, and the author.—In the field of a microscope, the inflamed capillaries seem uniformly red, and the circulation in them is retarded or has ceased. Serum and coagulable lymph are effused in the areolæ of the tissue; and, if the inflammation is very intense, the exuded fluid is more or less coloured by the exudation of red globules or of blood. The whole of the inflamed part is quite opaque. As soon as suppuration commences, the red colour begins to disappear in various points, giving place to a yellowish granular-like matter in the capillaries, and connecting cellular tissue. In the centre of the inflamed tissue, several of the capillary vessels, which were obscured by the accumulated blood, re-appear, — some containing red, others yellowish grey, globules, which gradually become more distinct, increase in number and size, begin to move slowly, and, traversing the capillaries, arrive at the surface of the tissue, or at the edges of the solution of continuity, if this has occurred, in the form of globules of pus (CARSWELL.). GENDRIN states, that he has distinctly seen the globules of blood, after stagnating in the capillaries of the inflamed part, losing their colouring envelopes, becoming opaque, and assuming a greyish yellow colour, approaching to that of pus; and that he has traced them moving slowly in the capillaries, and, as they advanced to the suppurating surface, gradually acquiring all the characters of pus. The observations of KALTENBRUNNER agree with those of GENDRIN, as to the transformation of the blood-globules into the globules of pus, and as to this taking place *within* the capillaries; but they also seem to prove, what I have observed in several instances, that the red globules, or blood, exuded in an intense state of inflammation into the areolæ of the tissue, undergo a similar change to that which takes place within the capillaries, when the circulation becomes stagnant in them; and that pus may thus be formed *without*, as well as *within*, the capillaries of an inflamed part, the fluid portion of the secretion consisting of the serum of the blood. KALTENBRUNNER even supposes, that not only the blood of the inflamed tissue, but likewise a part of the tissue itself, is converted into pus-globules. But, I belive that this takes place only where suppuration is followed by *ulceration* (§ 48.), or where an ulcerated surface secretes a puriform fluid.

46. From these facts it is evident, that, in an inflamed part, certain changes precede the formation of pus: — 1st. A loss of the vital tone, or a change of vital action in the extreme capillaries; — 2d. A retardation or stagnation of the circulation, and partial coagulation of the blood in them; — 3d. A change of the blood-globules into pus-globules, and the discharge of the latter with a portion of serum on the suppurating surface; — 4th. A similar change of the globules of blood extravasated in the inflamed part, — these globules losing their colouring envelopes and becoming the globules of pus. As connected with the subject of suppuration, some notice might be taken of the presence of pus in the general circulation, or in situations remote from the seat of inflammation; but as this belongs rather to the translation and metastasis of inflammation—to consecutive inflammation, it will be considered hereafter.

47. *Pus*, or purulent matter, — the product of suppuration, — is a slightly unctuous fluid, of the consistence of thin cream, which it otherwise resembles. It is generally of a whitish or pale yellowish colour, and of a mawkish or sweetish taste. It is nearly inodorous when cold, but when heated, it emits a faint, sickly, and unpleasant odour. Under the microscope, it presents corpuscles or particles swimming in a serous fluid. These corpuscles resemble the central corpuscles of the globules of the blood, deprived of their colouring envelopes, and consist of a highly animalised albumen. The serous part of the secretion differs but little from the serum of the blood. In many situations, pus is mixed with the more natural secretions of the part; the latter being either altered in their characters, or increased in quantity. This is especially the case in acute inflammations of mucous surfaces; the fluid excreted consisting of pus and mucus in variable proportions. The

other relations of suppuration are fully considered in the article ABSCESS.

48. *d. Ulceration* is distinguished from suppuration chiefly in its being attended by a loss of substance — by a destruction of parts; and by a more or less abundant secretion of a puriform, ichorous, fœtid, sanious, and variously coloured fluid. It may immediately result from inflammation, or be consequent upon suppuration, or the formation of an abscess. It depends chiefly upon causes connected with the treatment of the part in the earlier stages of inflammation; upon the diathesis, habit of body, or existing constitutional vice, as scrofula, scurvy, syphilis; and upon the state of the digestive and excreting functions. Ulceration is always preceded by softening — by a loss of the vital cohesion of the tissue inflamed, at the surface or part most remote from the centre of circulation, or at the termination of the capillary vessels. Along with the softening there is also a more or less copious effusion or exudation of a serous fluid, in which the organic molecules, which have lost their vital cohesion, are liquefied or suspended. Hence the discharge is ichorous, offensive, sanious, or coloured. In the more rapid or phagedenic states of ulceration, and when the discharge is scanty, and in parts covering abscesses, very probably the organic molecules are absorbed nearly as fast as they lose that degree of vital attraction, necessary to their cohesion in the diseased surface. From this, the relation of ulceration to sphacelation and gangrene, particularly hospital gangrene, is apparent. (See art. GANGRENE.)

49. When an ulcerated part begins to return to a healthy state of action, the diseased secretion becomes more puriform or albuminous; and an attempt is made to restore the loss of structure by a process called *granulation*. The vessels of the ulcerated surface acquire a more sthenic action; the disposition in the tissues to lose their vital attraction or cohesion is arrested; and the secretion assumes at first a puriform, and afterwards an albumino-puriform, character; the albuminous or cocoagulable portion of the secretion coating the inflamed surface, protecting it, and ultimately becoming organised or partially identified with it. These changes in the ulcerated surface are evidently brought about by an improvement in the organic nervous influence of the part; and hence the success of a treatment, general and local, calculated to restore or to promote the energy of this influence, especially through the medium of the digestive and respiratory organs.

50. *e. Induration*, and *thickening* or *hypertrophy*, of structures, consequent upon inflammation, are discussed in the articles on these lesions. It is unnecessary to offer any further remark respecting them, than that they are generally consequences of chronic inflammation, and of acute or sub-acute inflammations which have passed into the chronic state. They may also be referred to the exudation, into the areolar tissue, of a sero-albuminous fluid, the more serous parts having been absorbed, and the albuminous parts organised, or assimilated to the structure including them. From this source other organic lesions may arise, according as the exuded matters undergo a more or less complete organisation, or according as they are retained in the state of merely minute amorphous masses disseminated in the areolæ of the structures, and are preserved from dissolution or change by the vitality of the surrounding parts. (See arts. INDURATION, and HYPERTROPHY; also DISEASE.)

51. II. VARIETIES OR MODIFICATIONS.—Having described inflammation, as occurring in a previously healthy constitution, or in its *sthenic form;* and having viewed this as the more usual and standard condition of the disease, whether appearing in the *acute*, *chronic*, or *intermediate* states; it becomes necessary to consider the *alterations or deflections from sthenic inflammatory action*, occasioned by the previous health, or the existing constitution, of the patient, and by the nature of the predisposing, the exciting, and the concurrent causes. Many of the lesions of vascular action arising from these sources are so different from the true sthenic condition now discussed, as to admit of doubts as to the propriety of viewing them as inflammations; yet they have intimate relations to the sthenic disease, inasmuch as they possess nearly the same local characters as it, and often in a very remarkable degree, — as they differ from it merely in kind, and often by slight shades only, — as they may be converted into it by a general and local restorative treatment, — and as the sthenic disease may be reduced to some one of these lesions by various depressing influences, or contaminating agents.

52. In the view just taken of sthenic inflammation, we have seen merely different *grades* of action; the disease being *acute*, or *chronic*, or some intermediate state usually called *sub-acute*, according to the degree of *severity* or of *activity* presented by the morbid action, relatively to the constitution and powers of the patient. Whilst the term *active* has been applied by many to the more acute states of sthenic inflammation, the word *passive* has been used as synonymous with the chronic conditions. To the former of these appellations, and to its application, little objection need be urged; but the latter is by no means applicable to any state of inflammation — neither to the chronic states of sthenic inflammation, nor to the *asthenic varieties* about to be considered.

53. With the increased local and general vascular action, constituting the states of inflammation above described, the constitutional powers are not much reduced or otherwise altered, nor are the depurating functions impaired, nor is the blood materially vitiated or deteriorated, in the early stages at least, or until the disease approaches an unfavourable termination. But in the varieties about to be noticed, the powers of life are much depressed or otherwise deranged from the commencement, the depurating or excreting functions are interrupted, the blood more or less altered, and the nervous sensibilities increased. Hence, vital resistance to the changes consequent upon increased susceptibility and diseased vascular action is greatly impaired, and disorganisation rapidly supervenes, and as speedily proceeds, unless arrested by the most efficient means. To these circumstances, however produced, are to be imputed those alterations, or deflections, from the sthenic or true form of inflammation, that frequently present themselves in practice, with characters varying with the cause and seat of the disease, and with the peculiarities of the patient. As the inflammations already described present no obvious loss of power in their earlier stages, or until their terminations, and are therefore justly termed *sthenic;* so those about to be considered

may be generally denominated *asthenic*, from the want of organic nervous energy, and the loss of vital resistance to the progress of disorganisation, which they usually present, unless controlled by judicious treatment. They have also been denominated *typhoid*, *venous*, *erythematic* and *erysipelatous;* but these are chiefly specific terms, the generic appellations, *spreading*, *diffusive*, *disorganising*, or *asthenic*, being more appropriate.

54. i. OF ASTHENIC INFLAMMATIONS.—*A. Of the Local Alterations, or Characters.*—*a. Uneasy sensation*, or *pain*, is the earliest, and sometimes the most remarkable, symptom, particularly when serous membranes or circulating vessels are affected. When the disease is caused by external injury, by the inoculation of morbid matters, as in punctures during dissection, the pain is often early and acutely felt, even in cellular parts, although no other change has yet appeared. In nervous, susceptible, and weakened persons, the pain is so acute as to accelerate or increase the restlessness or delirium consequent upon the constitutional symptoms, which are often remarkably severe, compared with the apparent small extent of the local disease, especially when caused by an animal poison. Pain, however, is frequently not very severe in certain forms of asthenic inflammation, particularly when parenchymatous organs are their seat, and when they are consequent upon some disease, which has lowered or exhausted organic nervous power and sensibility. The inflammations which complicate or appear in the course of continued fevers, are illustrations of this; and the metastasis of erysipelas, or the transference of inflammation from an external part to an internal organ, seldom gives rise to much pain. The amount of uneasy sensation depends chiefly upon the tissue implicated, upon the exciting cause, upon the constitutional susceptibility of the patient, and upon the state of the blood. In cellular, mucous, and yielding structures, it is sometimes slight, particularly if the purity of the blood is impaired by imperfect excretion, unless the inflamed and turgid parts be partially strangulated by aponeurotic expansions or other unyielding textures, as in diffusive inflammation of the *cellular tissue*, and in various states of *erysipelas*. In this latter, and in inflammation of the lymphatics, the pain is generally tensive, burning, or stinging, and occasionally remittent. There are always great tenderness, and sensibility to the touch, unless the affected parts are deeply seated.

55. *b. Redness* and *vascular injection* are always very remarkable. The former often either rapidly passes into a deep, dark, brownish-red, livid, or purplish hue; or presents more or less of either of these from the commencement. It is sometimes of a pale or yellowish red tint. The vessels are injected and distended, and the current of circulation through them is slow, or impeded. The already dark hue of the blood is further deepened by this congestion; and the exudation of the serous portion of it is facilitated by the weakened state of the vital cohesion of the tissues, by the impaired tone of the capillaries, by the increased frequency of the heart's contractions, and by the diminished crasis of the blood itself. The discolouration and injection of the part in the various asthenic states of inflammation are generally indices of the extent to which the vital tone of the vessels and tissues is exhausted, and the blood, especially that circulating in the part, is altered.

56. *c. Increased temperature* is present chiefly at the commencement of asthenic inflammation, and when membranous tissues and circulating vessels are attacked. Even in these cases, at an early period, the actual rise of temperature in the affected part is often not greater than on the surface of the body generally. Where the febrile disturbance is great, the pulse very quick, and the skin dry, the heat of the general surface and of the diseased part is very considerable; but it is also peculiar, as observed in typhoid and malignant fevers; it seems to be greater than it really is, and is attended by a stinging, harsh, and unpleasant sensation. As effusion into the areolar tissue of the part proceeds, and as the swelling extends, little or no increase of heat is usually observed; and sometimes the temperature of the part may even be lower than that of the surface of the trunk, or even lower than natural.

57. *d. Swelling* is considerable, and sometimes very great, when cellular or parenchymatous tissues are affected. It is caused at first by the relaxation of the vital tone of the capillaries and tissues, and by the injection of the former; but consecutively, and chiefly, by the effusion of serum from the diseased vessels. The swelling is always diffused, is disposed to extend itself, and is never acuminated or convex. It is generally soft, sometimes boggy or œdematous, and never elastic or hard, unless from the tension occasioned by aponeurotic or unyielding structures stretched over the swollen part. In mucous and serous membranes, it is much less manifest, although existing more or less; and, in them, it is owing chiefly to the distension of the capillary vessels, and to the relaxation of the tissues themselves.

58. *e.* The *secretions* and *functions* are always disordered by asthenic inflammation:—the former are altered and generally increased in quantity; the latter are remarkably impaired. When a secreting membrane or surface is attacked by it, the discharge is variously changed from the healthy state, the change obviously arising from the impaired state of vital power, the morbid condition of the blood, and the acceleration of the circulation. The effusion generally consists of a foul, dark, turbid, ichorous, septic, sometimes whey-like, fluid. In puerperal females, it is often remarkably abundant, and contains much curd-like or semi-coagulated matter, partially separated from a turbid or whey-like serum. This watery, serous, or ichorous fluid, is also abundantly effused in the areola of the asthenically inflamed cellular tissue (see *Diffusive Inflammation of* CELLULAR TISSUE); and, owing to the deficiency or absence of coagulable lymph or albumen, it readily spreads to, and infects, or contaminates, the surrounding tissues. This is one of the chief characters of asthenic inflammation; its *spreading* or *diffusive nature*, especially, resulting from the states of general or local vital power, and of vascular action, which are insufficient for the formation of coagulable lymph, by which the local disease may be limited.

59. The secretions from glandular organs are also remarkably altered in quality as well as in quantity; but their quantity is as often diminished as increased. Sometimes they are nearly or altogether suppressed, particularly in extreme cases

of the disease, manifestly owing to the loss of organic nervous influence or vital power, in connection with the distention of the capillaries. When the substance of the liver is the seat of asthenic or diffusive inflammation, bile is either not secreted, or is absorbed as soon as it is secreted, giving rise to one or other of the forms of JAUNDICE (§ 28.) described in that article as consequent thereon. The swelling, also, caused by the distention of the diseased vessels, and by the effusion into the parenchyma of the organ, is so great as to press upon the ramifications of the ducts, and to prevent the passage of the fluid along them as it is secreted. This is especially the case, when the secreting organ is inclosed in an envelope or membrane, which does not readily yield to the distension thus occasioned.

60. *B. The Constitutional Symptoms.* — Asthenic inflammations derive their peculiar characters, local as well as general, from either pre-existing disorder, or the poisonous nature of the exciting cause. The former consists chiefly of *debility*, as manifested in the assimulating, circulating, and excreting functions (see DEBILITY, § 12. *et seq.*). The vital powers are impaired throughout the frame, and especially in the organs of digestion, circulation, and depuration. Hence, with increased sensibility and susceptibility of the nervous system, the blood soon becomes affected, and is less suited for the production of a healthy secretion, and for the formation of coagulable lymph or albumen in the seat of inflammation, than in persons otherwise circumstanced. When asthenic inflammation depends upon the exciting causes, it will generally be found that they possess poisonous or contaminating properties which infect the frame, whilst they produce inflammatory action in certain structures by their specific operation, as in the infection of erysipelas; or which contaminate the system by acting directly upon the part with which they come in contact, as when a septic animal fluid, or an animal poison, is applied to a wounded or abraded surface. Very frequently asthenic inflammations derive their constitutional, as well as their local, peculiarities from both these sources, — from the previous state of health as well as from the nature of the exciting cause. In surgical practice, they not infrequently depend upon the severity of the shock sustained by the system, in cases of very severe local injury, as in extensive bruises and crushing wounds, or after operations. In all cases of asthenic inflammation, although the states of constitutional or vital power, and of the circulating fluid, are chiefly concerned in modifying the character of the local disease, yet the local, generally reacts upon the general affection, the one aggravating the other reciprocally and progressively, until either a fatal disorganisation, or arrest of function takes place, or a favourable change is brought about by energetic means. This is evinced especially in the diffusive visceral inflammations occurring in diseased or cachectic habits of body, or in the course of continued fevers, and in certain forms of erysipelas, and of inflammation of the cellular tissue.

61. The severity of the constitutional symptoms frequently has but little apparent relation to the extent of the local inflammation; the latter being comparatively slight, and presenting but little of the spreading, diffusive, or disorganising characters usually observed in connection with remarkable febrile commotion and vital depression. A person may experience a slight abrasion or puncture of the integuments, followed by inflammation to no great extent, with a more or loss foul discharge, or with a discharge not materially different from that following sthenic inflammation; and yet the constitutional affection may be of the most violent description, and characterised by excessive vascular action, by great excitement and morbid sensibility of the nervous system, and by remarkable depression of nervous power and of vital resistance. It is this state of disease especially which Mr. TRAVERS has so well described under the terms *Direct and Reflected Constitutional Irritation* — terms which, in the present state of our knowledge, convey as satisfactory an idea of the nature of these causes, as any other that can be employed. The remarkable constitutional disturbance characterising them, has been ascribed to sympathy; and probably it may be produced in some instances by the absorption of a morbid or poisonous secretion or fluid into the circulation. But the majority, and these the most severe and the most marked, as to all the peculiarities of these maladies, can be ascribed only to a morbid impression or lesion of the organic nervous system, that is soon propagated throughout the frame, implicating not only the vascular system, but also the cerebro-spinal functions, and all the vital manifestations. So intense a disease, produced by so slight a cause, and depending, apparently, upon so small a local lesion, is, it is true, very inadequately explained by the terms *irritative fever* and *constitutional irritation*, and far less by that of *constitutional sympathy*; but the difficulty is, to denominate them by any other name which shall be in every respect appropriate.

62. The constitutional symptoms attending upon asthenic, foul, or spreading inflammations, appear variously grouped or characterised; but they may be referred chiefly to the following types or varieties: — 1st. General and remarkable depression of organic nervous or vital power, without vascular reaction; — 2d. General depression of vital power, with vascular reaction or excitement; — 3d. Vital depression, with acute nervous sensibility and cerebral disorder; — and, 4th. Vital depression, with remarkable nervous excitement and vascular reaction. — Although the constitutional commotion usually appears in one or other of these forms, yet it must be admitted, that the arrangement is somewhat conventional; that there are often intermediate, or mixed, states of disturbance; and that the general affection may commence in either of these forms, and pass into another, owing to the influences to which the patient is subjected in its course. Nay, fever attending sthenic or adhesive inflammation may be converted into either of these low types of fever, by the more powerful depressing or contaminating influences; and the latter may be changed into the former, by agents of an opposite nature, — similar alterations taking place, from the same causes, in the characters, consequences, and terminations of the local affection.

63. *a. General vital depression, without reaction*, is not of frequent occurrence, and is produced only by a very sedative or poisonous cause, relatively to the power of vital resistance, when depending upon a slight local lesion. It is very

frequently observed after severe shocks, crushing injuries, and operations. However induced, it usually commences with a sense of general coldness, sinking, anxiety at the epigastrium, nausea, occasionally vomiting, and remarkable despondency or depression of spirits. The skin is of the natural or of a diminished temperature; and there is generally little or no thirst. The mental faculties become obscured or stupefied, and the countenance collapsed; and convulsive motions or twitches frequently occur. The pulse is weak, irregular, small, or compressible — sometimes quick or intermittent, but always deficient in power. Vomiting is often attended by little retching, matters being brought up with a species of singultus; and the alvine excretions are always morbid and offensive. As the powers of life sink, low delirium, coma, the supine posture, hiccup, complete physical prostration, sharpened features, and a cold clammy state of the surface, supervene; the local disease either becoming more deeply discoloured, or extending towards the centre of the body, or passing into gangrenous disorganisation.

64. *b. Vital depression, with general vascular excitement and reaction*, is much more common than the preceding variety of constitutional affection. It is generally ushered in by chills or rigors — sometimes with nausea and even vomiting. The skin soon becomes hot, dry, burning, or harsh; but occasionally the affected part is hot and burning, whilst the temperature of the surface is very little elevated. The pulse is generally above 110°, and sometimes it is 120°, or even upwards; it is compressible, open, broad, quick, and irritable — becoming more so, and smaller or weaker, as the disease proceeds. The tongue is foul or loaded, sometimes glossy, and afterwards dry and mahogany coloured. The evacuations are offensive, and otherwise disordered. Medicines, or substances taken into the stomach, are soon thrown off; and there is generally thirst, which is at first urgent, but becomes less so, and is at last not complained of, particularly when delirium takes place. Delirium first appears at night, and either remits in the morning, or continues; and is often followed by coma. In some instances, the vascular excitement is most rapidly developed, or reaction speedily follows the rigors, and all the symptoms soon become severe; violent headach, with anxious collapsed countenance, succeeded by delirium, appearing early. In other cases, the general excitement is more slowly and more moderately produced, and not until several rigors and attempts at reaction have taken place. In either case, exhaustion speedily occurs, and all the symptoms of the advanced stage of the preceding variety supervene. The disease is rapid in its progress, if it be not early arrested by treatment; and the local alteration extends more or less, assumes a more livid or dark hue, or more aggravated form, or becomes more disorganised. When pus has been formed at an early stage of the local affection, and is confined in deep-seated parts, or beneath fasciæ, it is often offensive, discoloured, and different from that discharged after sthenic inflammation. In many instances, the local alteration is apparently slight, in relation to the severity of the constitutional affection; but in others it has extended to a very considerable distance along the absorbents, veins, or cellular tissues, from its primary seat; and has thus either been overlooked, or has infected the blood. (See arts. CELLULAR TISSUE — *Diffusive Inflammation of;* ERYSIPELAS; LYMPHATICS, and VEINS.)

65. *c. Vital depression, with acute nervous sensibility and cerebral disorder*, is very often observed to accompany asthenic inflammations caused by animal poisons and septic animal secretions, especially by the inoculation of either of them during the dissection of dead bodies. In all these, the pain felt in the seat of injury is most excruciating, and is attended by general irritability and impatience; by irregular chills, loss of appetite, intense headach, white tongue, thirst, anxious countenance, nausea, and sometimes vomiting; a frequent, small, quick, or irritable pulse; hot and dry skin; sleeplessness followed by delirium; and, lastly, a dry brown state of the tongue; vomiting, singultus, coma, subsultus tendinum, collapsed features, cold clammy perspirations, and quick, laborious respiration. The febrile commotion often commences insidiously, and without rigors or chills, and proceeds with much rapidity. In this variety, particularly when produced by the causes just stated, morbid sensibility, general irritability, violent headach, and want of sleep, early delirium, and suppressed, imperfect, or weak vascular reaction, are characteristic phenomena; the other symptoms being less constant. The local alterations generally consist of early and remarkably intense pain; excessive and spreading tumefaction; and of purulent formations, first on the seat of injury, but extending successively to parts nearer to the centre of the body, until the trunk and large cavities are reached. The cellular tissue, in the course of veins and absorbents, or around the glands of the latter, is most commonly attacked; and, ultimately, the serous envelopes on internal organs, or even these organs themselves, occasionally become implicated; but other parts, particularly the lymphatics, fasciæ, and veins, are often also affected.

66. *d. Vital depression, excessive irritability, violent pain, and vascular excitement*, often attend cases of asthenic inflammation, arising from similar causes to those inducing either of the former varieties of constitutional commotion; the difference in the degree of vital depression in the one, of nervous disorder in the other, and of vascular excitement in a third, depending chiefly upon the temperament, habit of body, vital power, age, and previous health of the individual, and upon the nature of the exciting cause. In proportion as the cause is of a poisonous, depressing, septic, or contaminating nature, relatively to nervous susceptibility and vascular activity, will the local affection be diffusive, spreading, or disorganising, and the constitutional disturbance be characterised by a predominance of the symptoms marking excessive vital depression, or acute nervous suffering, or tumultuous vascular excitement, devoid of the power of resistance. When the impression of the cause, or the subsequent influence of the local disease, depresses the vital energies beyond recovery, or the power of reaction, the extension of disorganisation, and the sinking of the manifestations of life throughout the œconomy, are remarkably prominent. Where either the cause or the local disease is less overwhelming, relatively to the state of constitutional power, reaction takes

place, and efforts are thereby made to resist the progress of the local and general mischief. Violent pain, and other severe nervous symptoms, whether occasioned by the nature of the exciting cause, or depending upon the state of the system, may attend any of the varieties of constitutional affection — either that of continued depression, or that of vascular reaction. Where the nervous sufferings are extreme, the vascular system usually evinces some degree of excitement, but it is often slight and without power. In certain cases, the reaction is as excessive as that marking the second variety of constitutional affection (§ 63.); is accompanied with the same symptoms, and runs a similar course; the only difference being in the greater affection of the nervous system than in it. In other cases, vascular excitement is not sensibly raised, unless in so far as the great rapidity of the pulse may indicate it, as in the third variety (§ 65.). In either case, the cerebral disturbance is great, and the disease tends rapidly to an unfavourable issue, if not arrested by active means.

67. If *blood* be taken in any of the varieties of asthenic inflammation, it either does not coagulate, assuming a treacly appearance, or it coagulates imperfectly, the crassamentum being loose; or the imperfect coagulum consists, in its upper half, of a mass resembling jelly in colour and consistence, the lower half containing the colouring matter. The blood, however, may present other appearances, particularly those already noticed, and those described in the article BLOOD (§ 110. *et seq.*). Venæsection, in these states of disease, is generally prejudicial, although, in some of the cases, where the vascular reaction is great, local depletions are often serviceable by unloading the distended capillaries, and diminishing local tension.

68. ii. PROGRESS AND DURATION. — *A*. The *course* of asthenic inflammations is usually acute; and, unless controlled by salutary agents, is generally to an unfavourable termination. Whilst these inflammations most frequently originate in causes which are septic or poisonous, and depressing relatively to the power of the constitution; they also sometimes follow the more sthenic forms of morbid vascular action, in consequence either of the exhaustion following excessive reaction, or of the operation of sedative influences or contaminating agents. Hence, persons affected with sthenic inflammation, especially of a part exposed to the air, will have it changed to the asthenic form, soon after removal to the crowded wards of an hospital, or to any impure or unhealthy situation; and a similar change will also occur in visceral or internal inflammations, from any depressing influence, moral or physical. On the other hand, *asthenic* inflammations are often converted into the *sthenic*, by restorative means acting upon either the respiratory or the digestive functions. Indeed, the principal indication of cure in the former, is to change them to the latter by such means; but, in order that this end should be accomplished, they must be energetically and appropriately employed. Repeated efforts at restoration, in respect both of the local lesion and the constitutional disturbance, are often made during the course of asthenic inflammation, especially when the treatment is only partially calculated to attain its objects; and the disease thus assumes a remittent appearance, and is much prolonged. When a morbid secretion, or fœtid pus, collects in a part which is deep-seated, although a favourable change may seem to have taken place, from the treatment, all the symptoms, local and constitutional, are sometimes speedily and unexpectedly aggravated, and the patient ultimately sinks. Occasionally, efforts at restoration recur oftener than once, before either recovery takes place, or death ensues. This is especially the case when the disease is caused by the inoculation of an animal secretion or poison; the inflammation extending along the cellular tissue, lymphatics, or veins, sometimes with occasional interruptions to its course, and with short ameliorations of the nervous and general disturbance, until the trunk of the body is reached, when all the symptoms become suddenly aggravated: vomiting, delirium, lurid and collapsed countenance, exhaustion of vascular and nervous power, laboured respiration, clammy perspiration, singultus, &c., appear, and the patient sinks.— Upon *dissection*, collections of fœtid pus, disorganisation of the cellular tissue, and lesions of the lymphatic and circulating vessels, are found extending to the central parts of the frame. The neighbouring cavities also contain effused fluid of various appearances, and the parenchymatous viscera purulent collections; the serous membranes being more or less inflamed, or partially adherent.

69. *B*. The *duration* of asthenic inflammations varies from a day or two to several weeks. It may not be longer than the former period in the puerperal state, and it may be prolonged to the latter in the recurring or remitting form of the disease. It is also often of very short duration, when caused by septic or contaminating animal matters. In many cases, however, when the spreading characters of the local disease, and the adynamic type of the symptomatic fever, have been arrested, a suppurative state of action continues for a considerable time, until more or less complete reparation of the affected part is accomplished. Indeed, this is generally the case when much disorganisation has taken place before the disease is arrested.

70. iii. COMPLICATIONS. — Asthenic inflammations frequently occur in the course of other diseases, particularly of exanthematic, continued, and adynamic fevers. It is chiefly when exanthematic fevers assume an adynamic form, that the inflammations which complicate them are truly asthenic. In the inflammatory type of these fevers, the associated local alterations possess more of the sthenic characters. The same applies to continued fevers; the adynamic species being those in which the asthenic states of local action, and of structural change, are chiefly observed. Indeed, asthenic inflammations frequently appear in the course, and even constitute a principal part, of all infectious, malignant, and contagious maladies. In these, they present, generally, modified or aggravated characters; but still they are merely varieties of this state of local morbid action, depending upon the specific nature of the cause, and of the constitutional affection. This is exemplified by scarlatina, small-pox, plague, &c. The course of most of these specific forms of asthenic inflammation is very acute; the complication often accelerating a fatal issue.

71. iv. TERMINATIONS and CONSEQUENCES.—*A*.

Asthenic inflammations *terminate*—1st, in a return to a healthy state of action;—2dly, in sphacelation or disorganisation; — and, 3dly, in dissolution without sphacelation, or without disorganisation so extensive as to be of itself productive of death.—*a. A return of the healthy state* of action is generally brought about by constitutional or local means, — by the former especially, or by both, — which are calculated to restore the vital powers, to impart tone to the relaxed capillaries and tissues, and to enable the part to secrete a more healthy pus, and to form coagulable lymph, by which the extension of the morbid action may be prevented. Thus it is necessary that the asthenic state should be changed into the sthenic before restoration can be accomplished; and this can be affected only by such means as will change the constitutional commotion from the adynamic type, — as will give energy to the organic nervous system, at the same time that they restrain excessive vascular action. As soon as the local disease and accompanying fever assume the sthenic conditions, reparation commences, and recovery takes place, as in these inflammations (§ 39.).

72. *b. Sphacelation* or *disorganisation* of the affected part may take place in very various grades. After the occurrence of either, the inflammation and disorganisation may cease to extend; the local action and febrile commotion may gradually or quickly assume a more sthenic character, particularly under restorative influences; the sphacelated portion may be thrown off, the disorganised part repaired, a suppurative action set up, and coagulable lymph thrown out around the seat of suppuration, whereby the surrounding structures will be protected, and the diseased parts more or less restored. Very frequently, however, when asthenic inflammations terminate in this way, the local mischief increases rapidly, and the general disturbance is aggravated, until life is at last extinguished. In these cases, the destruction of parts, either by sphacelation, or by phagedenic or sloughing ulceration, is generally so extensive, as to be incompatible with the continuance of life; but in those next to be noticed, the destruction of parts is not of itself sufficient to produce death.

73. *c. Dissolution, without sphacelation, or disorganisation,* so extensive as to account for the occurrence, is not an infrequent termination of asthenic inflammations. In such cases, the local affection is either merely the local manifestation of a severe constitutional malady, or is attended by a state of vital depression or exhaustion so extreme, as to terminate life, before it had advanced to the changes constituting actual disorganisation. In some of these cases, the result depends chiefly upon the morbid impression first made upon, and continuing to influence, the organic nervous energy, and in others it is partly owing to the morbid state of the blood, arising either from the same source, or from contingent circumstances or changes. When serous or mucous membranes are the seat of asthenic inflammation, a fatal termination is owing rather to the vital depression consequent upon the extent of surface to which the morbid action has been extended, than to the amount of disorganisation. This is evinced in many cases of general *peritonitis.* When a mucous surface engaged in the performance of vital actions is the seat of the disease, the powers of life often sink rapidly, both from the extent of surface affected, and from the interruption to the functions performed by it. This is shown in general *bronchitis*, and in certain states of *influenza.* Illustrations, moreover, of this termination of asthenic inflammations are often furnished by certain of the forms of disease caused by poisoned wounds, or by local injuries, and by some cases of *puerperal disease*, and even of *erysipelas* *, particularly when occurring in an infectious or epidemic form.

74. *B. Consequences.*—Asthenic inflammations give rise to certain changes which differ in some respects from those attending the sthenic form of the disease. It is necessary in practice to be fully acquainted with the differences between the results of both states of inflammation, especially as they are often so slight as to be overlooked, and as these results are generally essentially the same, but modified in character and in the period of their appearance. — *a. Effusion* of serous fluid is a very early consequence of asthenic inflammations. In parenchymatous or cellular parts it produces the extreme swelling (which is in some cases and situations œdematous or quaggy) attending the disease; and, in serous membranes, it often takes place to a great extent, and is in all respects an *effusion*, rather than an *exudation*. The appearance of the effused fluid varies much with the state of the disease, and with the degree of vital power and vascular reaction. In proportion as power is depressed, is the effused fluid ichorous, foul, abundant, and dark or discoloured; probably from some of the blood-globules, or of the colouring matter, having been effused with the serum. Hence it is, in some instances, almost sanguineous. As vascular reaction is increased, the fluid is turbid, flocculent, sero-albuminous, or sero-puriform; the situation and other circumstances attending upon the effusion modifying its character. The puerperal state, and the persistence or suppression of the discharges and secretions attending this state, modify remarkably the characters of the effused fluid, as in the asthenic peritonitis associated with adynamic puerperal fever. The fluid effused from the mucous surfaces is also much modified from that exuded during sthenic inflammatory action: it is usually less mucous and less albuminous, and more watery, serous, ichorous, or sero-sanguineous, as in cases of adynamic Dysentery (see § 26, 27.). It is sometimes glairy as well as watery; and when vital power is extremely depressed, it is very dark-coloured, offensive, and sanious. When sthenic inflammation passes into the asthenic state, owing to failure of the powers of life, or to morbid states of the blood, the effused fluids also pass from a consistent and coagulable, to a fluid and ichorous, state. The fluid, effused during asthenic inflammation of cellular parts, also partakes more or less of the characters just mentioned. It is deficient in albumen or coagulable lymph, and hence more readily infiltrates the surrounding tissues; and when it is of an ichorous nature, it seems to contaminate the parts to which it extends. Thus asthenic inflammation of cellular tissues is never limited by the effusion of coagulable lymph, unless a change be

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* In 1836, erysipelas prevailed most generally and fatally in the Orkney Islands. Its infectious nature was fully demonstrated on many occasions. It assumed a low or adynamic form, and the deaths from it were more numerous, for the period of its continuance, than from any other disease that had prevailed within the memory of the oldest practitioner.

produced in the general and local disease by means hereafter to be pointed out; and then lymph is formed around the seat of morbid action, agglutinating the areolæ of the tissue, and becoming a barrier between the morbid matters effused in the central diseased parts, and the healthy structure.

75. *b. Softening* is the next early consequence of asthenic inflammation, and one of the most remarkable. It is evidently owing to the extreme prostration of vital power in the part, causing a loss of the vital cohesion of the tissues, progressive with the disease. I have seen the softening so extreme, that the structures have been torn with the utmost ease after death, although the examination was made whilst the body was still warm. When this state of morbid action affects cellular and mucous parts, the softening and want of cohesion are equal to that of wet bibulous paper. They are often also very remarkable when the serous membranes have been implicated. In some cases of infectious puerperal fevers, complicated with asthenic peritonitis and hysteritis, I have found the peritoneum, and even the substance of the uterus, not only discoloured, but so softened as to be torn with the utmost ease.

76. *c. Suppuration* of a truly restorative nature is met with chiefly when the morbid action verges towards the sthenic type. Purulent matter is frequently found in parts asthenically inflamed, and is often secreted from surfaces thus affected; but it is generally offensive, and otherwise modified from that described above (§ 47.). It is often tinged, particularly in cellular and mucous parts, with the colouring substance of the blood. As the puriform matter, secreted by this state of action, is not confined from the adjoining structures by the effusion of coagulating lymph, and by the cysts thereby formed, it is frequently partially absorbed into the circulation. It thus contaminates the blood, and aggravates both the constitutional and the local disease, — rendering still more morbid the secretions and excretions, as well as the discharge from the seat of inflammation. When the matter passes to a more perfect pus, the change depends upon an improvement in the local and general action, and is an indication of commencing restoration, if unfavourable influences do not come into operation. Mucous and serous membranes often secrete a puriform fluid, presenting characters, varying with the states of vital power and of vascular action, when asthenically inflamed, and generally in a very large quantity. The asthenic bronchitis attending severe cases of *influenza* generally gave rise to a copious secretion of a thin muco-puriform fluid; and the effusions into shut cavities, in some cases of complicated erysipelas, of puerperal fever, &c., consist of a sero-puriform matter, occasionally tinged with blood, or otherwise modified.

77. *d. Ulceration* from asthenic inflammation is characterised by a rapid loss of substance, and its consequent extension. The edges and bottom of the ulcers are softened; sometimes not materially, if at all, elevated; and occasionally not much discoloured, or even inflamed. In other instances they are foul, dark, phagedenic, or sloughing. The discharge from the ulcers is usually ichorous, sanious, sometimes slimy and watery, and always offensive. The loss of substance is in them more owing to deprivation of the vital cohesion of the tissues at the diseased surface, and to the liquefaction or admixture of the dead molecules in the fluid discharge, than to absorption; which, however, takes place to some extent. When the ulceration is sloughy or gangrenous, and the discharge copious and very offensive, it is chiefly owing to the former. In some of these cases, the loss of vital power and cohesion is much more rapid than the solution of the molecules in the discharge, and then large sloughs cover the ulcerated parts. In some instances, the sloughy appearance proceeds from the more consistent or albuminous portion of the discharge having attached itself to the surface, whilst the fluid part either is dissipated by evaporation, or has passed off. This, however, is observed chiefly when a change to a more sthenic action takes place in the inflamed tissues. When absorption proceeds rapidly on the ulcerated surface, the constitutional symptoms are thereby greatly aggravated, and an unfavourable termination accelerated. Asthenic inflammations of the mucous surface, and particularly of that of the bowels, are often followed by ulceration, which occasionally presents a sloughing or phagedenic appearance. (See DYSENTERY, § 54. 56.)

78. III. MODIFICATION OF INFLAMMATION BY STRUCTURE. — Inflammation has been considered above, chiefly with reference to vital power and vascular action, without, however, overlooking the modifications depending upon structure. On this latter part of the subject, a very few general remarks may yet be added. — Dr. C. SMITH first ascribed the differences of inflammation to differences of tissue; and the writings of BICHAT, PINEL, BÉCLARD, GENDRIN, and others, have tended to give very general currency to these views, and to carry them much beyond their legitimate value. Structure certainly modifies, not only the course and terminations, but also the results or products of inflammation. But still the chief sources of difference are, the states of vital power and of vascular action. Besides, inflammation of an organ or part is not limited to a single constituent tissue of that organ, although it may have originated in one tissue only. It usually implicates two or more; although the cellular tissue, being, as it were, the matrix of the rest, is that chiefly affected. When inflammation thus extends to different textures, its characters, terminations, and consequences are modified more by the vital conditions above insisted upon, than by differences of structure; and, even when very differently organised parts are affected, the consequences of the morbid action in all of them are often very nearly the same, and are obviously owing chiefly to the states of vital power and vascular action. Even when mucous or serous surfaces are inflamed, the morbid action is seldom confined to them, the connecting cellular tissue being more or less implicated, and frequently also the adjoining structures; but the results and terminations of this action chiefly depend upon the constitutional affection; or, rather, the local and the general disease are both consequences merely of the morbid states to which they have been just ascribed, and are hence more intimately dependent upon them than upon other circumstances. In the present day, so much has been imputed to structure and to its modifications, natural and morbid; and alterations of function, of

sensibility, and of action, have been so generally connected with lesions of organisation, both by teachers and writers, as to mislead those who are seldom at the trouble of thinking, for themselves, or of attending to the suggestions of common sense in medical observation and reasoning. Organisation, function, and disease are so frequently viewed in connection; and function is so generally considered as resulting from structure, and disease from alterations of structure, that the principle which not only endows, and regulates, and controuls, and ultimately arrests, the functions, but also alters the whole organisation, is left out of the question; and the results of observation in respect of its various conditions and agencies — the circumstances which modify these conditions, and which change its manifestations in the various organs, either from healthy to morbid states, or from the latter to the former — are either insufficiently appreciated, or entirely neglected. Too much is ascribed to the material and gross effects, whilst the conditions out of which they arise are kept out of view, in respect both of their primary operation, and of their continued influence.— It is unnecessary to add any thing to what is advanced on the modifications of inflammation by structure, in the various articles where the pathology of the different tissues and organs is fully discussed.

79. IV. Diagnosis.—*Inflammation may exist in internal parts without being evinced by the usual local and general symptoms*; *and the parts affected by it during life may present very few or even no indications of it after death*; whilst *some affections closely resemble inflammation, and certain appearances very nearly approach those produced by it in the tissues.* To each of these points the *diagnosis of inflammations in general* has especial reference.

80. *A.* Inflammation may be so *latent*, or so *obscure*, owing to the absence of the most important symptoms, and to its seat, as to be recognised with great difficulty. The more slight and chronic forms of inflammation are those most frequently latent or concealed; yet, the most acute states, especially of an asthenic form, and occurring in states of the system characterised by impaired sensibility, or in viscera whose organic sensibility is naturally low, are often latent or obscure. These *concealed inflammations* have been noticed by Hoffmann, Baglivi, Stoll, Weinholt, Mayer, Meckel, Reyland, and Hartmann, and been frequently observed in certain epidemics. They are more common in some organs than in others, especially in the course of adynamic and typhoid fevers, and in other complications. Although they may be expected to exist chiefly, if not altogether, in parenchymatous structures, where the organic sensibility is the most obscure, yet they are not infrequent in serous and sero-fibrous tissues, which are usually acutely sensible in the inflamed state. A morbid condition of the blood, as well as a generally impaired state of sensibility, seems to diminish sensibility in inflamed organs; for the *consecutive* or *secondary inflammations*, which proceed from pre-existing inflammation or disease, are commonly latent or concealed. — *a.* Epidemic fevers are very frequently complicated with acute asthenic inflammations, which seldom betray themselves during life, owing both to the depressed state of organic sensibility, and to the condition of the blood. The brain, the lungs, the liver, the kidneys, the digestive and the respiratory mucous surfaces, are the most liable to be thus affected, without indicating, upon the strictest examination, the extent of mischief; even auscultation, percussion, and pressure, often failing in furnishing the usual evidence of it. Inflammations, however, of the respiratory organs would much more frequently be concealed, if these means of investigation were not resorted to. Indeed, in fever, in influenza, and in various epidemics, pneumonia would almost always be concealed without these aids. Inflammation of the abdominal viscera, during these and other maladies, often, also, does not become manifest, unless upon the strictest examination of the stools, the urine, and the patient's position in bed; and upon the closest observation of the effects of pressure, &c.

81. *b.* Inflammations of serous and sero-fibrous structures are not infrequently latent, especially when they commence gradually and proceed slowly, or when they appear under the same circumstances as have just been mentioned. Pleuritis and pericarditis, in chronic forms, and as complications of febrile or epidemic maladies, are often concealed; and, although less frequently so when auscultation and percussion are employed, yet they often escape detection, especially when they give rise to little effusion, until disclosed by examination after death. The same is observed, although much less frequently, with respect to peritonitis, which, however, often supervenes in more or less obscured states in the course of adynamic fevers. — *c.* Concealed or obscure inflammation of mucous surfaces, especially of the digestive, is remarkably common. Many of the disorders attributed to disturbed function merely, are actually slighter states of inflammation. But much more severe and even acute forms of the disease may exist in this tissue, without the usual evidence of them having been furnished; and may run on to disorganisation and even to death. This, however, chiefly occurs in the course of continued fevers, and in the other circumstances just mentioned.

82. *B.* Various *febrile diseases*, and *painful* and *spasmodic affections*, so closely resemble inflammations as to be distinguished from them with difficulty. — *a.* Several internal inflammations are liable to be mistaken for the more *sthenic forms of continued fever*; and that is the more likely to occur when the latter become complicated, particularly at an early period of their course. But internal inflammations, especially those of a sthenic character, present, amongst the earliest phenomena, some, at least, of the principal symptoms of inflammation, even before the chills or rigors take place, which usually attend their development. The disease is strictly local from the commencement, and is not attended by the vital depression, and loss of muscular power, which not only accompany, but also precede, idiopathic fever. In the former, the fever is sympathetic of, and contingent upon, the local affection; in the latter, the inflammatory complication is a contingency or accident, arising either soon after the commencement, or in the course of the constitutional malady.

83. *b. Painful affections* of internal or concealed parts are liable to be mistaken for in-

flammation. But violent pain is not always an attendant upon inflammatory action, and unless in very acute cases of pleuritis and peritonitis, the pain of inflammation is seldom so severe as that which is dependant solely upon nervous disorder. It is only when the pain is attended by increased vascular action and heat of skin — by symptomatic fever, or, at least, by some degree of vascular excitement; by heat or tension in the vicinity of the pained part; and by a white, loaded, furred, or excited state of the tongue, and high-coloured urine; and when it is increased by pressure; that it becomes an indication of inflammation. The pain of nervous disorder is intermittent or remittent; it often suddenly ceases for an indefinite time, and as suddenly re-appears. It is not attended by a sense of burning, or of heat or of throbbing, and it is generally eased by firm pressure; whereas the pain of inflammation, when severe, becomes gradually so, is continued, although often exacerbated at times — is frequently throbbing, and is always associated with very marked disturbance of the functions of the pained part.

84. *c. Spasmodic disorders* are often referred to inflammatory action; and about twenty-five years ago, when blood-letting was the alleged cure for every thing, and for these disorders especially, they were firmly believed to proceed from this source. However, like painful affections, they are more frequently purely nervous, or independent of inflammation. It is true that they may be complicated with one or other of its forms, and that either painful or spasmodic affections may proceed from congestion, or active determination of blood to the organs thus affected, or to parts in their vicinity; but still these are not inflammation. Both classes of disorder most frequently proceed from some unnatural excitement or irritation at the origin, or in the course either of the nerves supplying the painful or convulsed part, or of those connected with them. Thus irritation of the intestinal or uterine nerves will produce pain or spasm, or both, in remote parts, by their *direct* and *reflex sympathy:* and the irritation of calculi in the kidneys will occasion colic by the *direct sympathy* of the ganglial nerves, and pain or spasm of distant voluntary parts, by the *reflex sympathy* of the cerebro-spinal nerves. (See *Direct and Reflex Sympathy*, in my Edition of RICHERAND's *Elements of Physiology*, edit. 1824, and 1829, p. 546.)

85. *d. Determination of blood* to particular organs may also be confounded with inflammation; and it may run on to the more sthenic forms of the disease, either in acute or in chronic states. But care should be taken to distinguish between them. I have, in the article BLOOD (§ 25.), entered fully upon the consideration of *local determination of blood*, and upon the differences between this affection and *inflammation;* and have shown, that whilst the *first* of these consists only of augmented circulation and functions of a part, and is unattended by symptomatic fever, or any other alteration, the *second* is an actively morbid state of the organic nervous influence, and of the vessels of a part, accompanied by symptomatic fever, and tending generally to change of structure, and often to disorganisation. In the *former* the functions are usually increased, or inordinately excited, the organic sensibility being either unaffected or not sensibly excited; in the *latter* the functions are rarely increased, but always much deranged, or entirely suppressed — organic sensibility being early excited or disordered, and generally sensibly disturbed. (See art. BLOOD, § 25—33.)

86. *e. Congestion of blood* in one or more organs has also been mistaken for inflammation, both during the life of the patient, and in examinations after death. In the article CONGESTION, I have defined it to be deficient vital tone or power, chiefly of the veins of an organ or part, occasioning accumulation of blood in them, and a languid or retarded circulation, the functions of the organ being thereby proportionately disordered. The pathological relations, terminations, appearances, and symptoms of this form of disorder, are there so fully described, that it is unnecessary to notice, at this place, the distinctions between it and inflammation, farther than that, in the *former*, the functions of a part are generally more or less impaired, without the organic sensibility being morbidly excited, and without symptomatic fever being present; in the *latter*, there is not only disturbance of functions, but also exalted or disordered sensibility and vascular action, and more or less febrile commotion. The one is a morbid state of the capillaries and arteries, originating in the organic nervous influence of a part, with which state the system generally sympathises; the other is an engorgement of the veins, sometimes extending to the capillaries, owing either to a mechanical obstruction to the return of blood through the former, or to deficient vital energy of the affected organ. — The blood in congested capillaries and veins is of a purple or black hue; whilst that in the capillaries of inflamed parts is much more red or florid. (See art. CONGESTION OF BLOOD.)

87. C. There are *certain appearances observed after death*, which are often difficult to be distinguished from those consequent upon inflammation. — *a.* The *congestion of blood* from mechanical obstacles to the circulation in the veins will not be mistaken for inflammation, if the exact state of the congested tissues, and if the course of the venous trunks, be carefully observed. It is in mucous membranes especially that the diagnosis is at all difficult, and in them only when the redness presents a ramiform appearance. In congestion from this cause the veins are full, often tortuous, and rarely varicose, — states not existing in inflammation; and the obstruction is commonly organic disease of the liver, or of the heart, or of the lungs, or the pressure of some tumour on large veins. Mechanical congestion sometimes, however, gives rise to inflammation, or is associated with it, and then the difficulty of diagnosis is much increased; but the state of the tissues, the capillaries of which are thus congested, and the presence of one or other of the usual consequences of inflammation, will generally lead to a correct conclusion. Dr. MACARTNEY mentions, in his work on *Inflammation*, which appeared as this article was passing through the press, that the arteries of a congested part are smaller than natural, and that he verified the fact by experiments; the corresponding arteries to the veins, which were congested by tying them, being very much reduced in size.

88. *b. Congestion from position or gravitation* is much more likely to be confounded with inflam-

mation, than that produced by mechanical obstacles; but attention to the relative situation of the congested part, especially with reference to a depending position and gravitation of the fluids, will generally aid the observer. When congestion of the capillaries is present, where gravitation could not aid in causing it, and when there is no manifest mechanical obstruction of the veins, it must be ascribed to inflammatory action, although the usual consequences of such action are absent, for the inflammation may have been too recent to have given rise to them.

89. *c. Redness from inbibition*, or from the dyeing of the internal coats of vessels by the colouring matter of the blood is sufficiently discussed in the article on *Diseases of* ARTERIES (§ 38.). It is of a scarlet red; is limited to the lining membrane of the vessels; and is unconnected with any change in them, or with any capillary injection, or congestion of the vasa vasorum: whereas inflammatory redness in the internal surface of vessels is less uniform than it; is more dull or pink coloured; extends to all the coats, although in different degrees; and is accompanied with capillary injection, with softening and opacity of the inner membrane, with thickening, serous infiltration, &c. of all the tunics.

90. *d. Inflammation sometimes leaves no marks of its existence after death.*— This occurs chiefly in the inflammatory affections of the skin, and in slight or incipient inflammation of serous membranes. But the redness attendant upon the disease is more frequently diminished after death, than altogether banished. The inflammatory redness of the skin, and mucous and serous membranes, attending the exanthemata, and continued fevers, often partially or wholly disappear after death: yet these structures present appearances which may be inferred to have resulted from inflammation, and to have been associated with redness and vascular injection during life, even although the fact had not been demonstrated to the senses. When the skin has been affected, it usually assumes a purplish hue in the seat of affection, and the cohesion of the cuticle to the subsequent tissue is early diminished, so that it soon may be detached with ease. The vital cohesion also of mucous and serous membranes is impaired more than is usually observed, although all redness has disappeared, and, in these parts, as well as in the skin, and cellular tissue, decomposition makes a more rapid progress than in the healthy structures. Vascular injection and redness may have vanished more or less, even in situations, and in forms of inflammation, where some one of the usual consequences of the disease is present. In this case, however, there can be no doubt of its nature.

91. V. CAUSES OF INFLAMMATIONS.—i. CONSTITUTIONAL AND PREDISPOSING CAUSES.—*a. Age* has considerable influence upon the production and progress of inflammation. The disposition, particularly to the more sthenic and acute forms of the disease, is greatest in childhood and youth. It may be said to diminish gradually from infancy to old age, whilst the more chronic and asthenic states become more frequent as age advances. The brain and membranes, the lungs and mucous surfaces, the skin, the serous surfaces within the thorax, and the glands, are the most frequently affected in children and young persons; and the digestive, respiratory, urinary, and generative organs, at more advanced epochs of existence, and generally in the order in which they are here enumerated.

92. *b. Sex* has but little influence in predisposing to inflammation. Males are more frequently affected, chiefly because they are exposed more than females to other predisposing, and to many of the exciting, causes. Females are most predisposed to inflammation at the commencement, during the continuance, and for some time after, the disappearance of the catamenia, and during the puerperal states, especially after parturition.

93. *c.* Of *temperaments* and *diathesis*, the most influential are the sanguineo-melancholic and irritable; the scrofulous, gouty, and rheumatic. It is chiefly owing to the descent of temperament and diathesis to the offspring, that inflammations sometimes present an *hereditary* tendency.

94. *d. Habits* and *modes of life* dispose to inflammations of various organs. Persons who are exposed to the open air, and to atmospheric vicissitudes, or who take active exercise in the air, are liable to inflammation of the respiratory organs; and inflammatory diseases generally assume a sthenic or acute character in them. Those who are indolent, sedentary, or confined to warm or close apartments, and unhealthy localities, are most subject to inflammations of the digestive, parenchymatous, and excreting viscera, particularly the excreting organs in the abdomen; the morbid action very frequently assuming either asthenic or chronic forms. — The influence of *modes of life* in predisposing to, and exciting, inflammatory maladies, is fully shown in the article on ARTS AND EMPLOYMENTS.

95. *e. Food and drink.* —The liberal use of animal food favours the occurrence of every form of inflammatory action, or generates an inflammatory diathesis. It is even very probable that certain kinds of animal food predispose to morbid vascular action in some structures in preference to others. The frequent or habitual use of pork seems to dispose chiefly to inflammations of the glands, joints, and bowels; and aids in generating a scrofulous diathesis. The laws of MOSES, with reference to animal food, have evidently had a salutary influence in rendering scrofulous, gouty, and inflammatory diseases less frequent among the Jews than in any other class of the community. In warm climates especially, the use of pork, and of the viscera and blood of animals, cannot fail of being prejudicial; and there cannot be a doubt that the proneness to inflammations among Europeans, in hot climates, arises chiefly from the quantity of animal food and exciting liquors consumed by them. Persons who live much upon fish are liable to inflammatory affections of the skin and digestive mucous surface; and, whilst flesh meats favour, in temperate climates, a sthenic form of inflammatory action, living much on fish disposes chiefly to the more asthenic and chronic states.

96. Exciting or *intoxicating beverages* predispose to, and often directly excite, inflammation, particularly of the digestive and urinary organs. The habitual use of these liquors frequently induces and keeps up morbid vascular action, chiefly of these parts, of a sub-acute or chronic kind, generally passing into confirmed structural change. These effects most commonly follow the use of spirituous liquors; and, next to these, new wines

and malt liquors are most prejudicial. Persons who use much of the former soon become subject to enlargements and obstructions of the abdominal viscera, consequent upon repeated or protracted inflammatory action; and those who drink the latter in large quantities, and who, at the same time, are very actively employed in the open air, as coal-heavers, draymen, &c., are liable to the most acute attacks, often attended by the most violent constitutional commotion, and terminating rapidly in disorganisation of the inflamed part.

97. *f. A plethoric habit of body,*— the more immediate consequence of diet and regimen,— remarkably favours the occurrence of inflammations. Persons who live fully, and take insufficient exercise, are extremely prone to these diseases, when exposed to atmospheric vicissitudes, and to cold, particularly if the body is quiescent, as when a person is carried rapidly through the air in an open carriage. Persons in large towns or cities, accustomed to warm close rooms, or engaged in sedentary occupations, and living fully, when called to a distance, often travel on the outside of coaches, or in open carriages, and are surprised when they are attacked by inflammations, the slighter forms and earlier stages of which they usually neglect. The surprise would have been, if they had escaped. In the article BLOOD, where the subject of vascular plethora and determinations of blood are discussed (§ 13. *et seq.*), I have shown how much fulness of the vascular system disposes to inflammatory action, and how frequently the latter follows as a consequence, or as a higher grade, of the former. When this system is overloaded, some part is liable to experience over-distention and augmented flux, which often soon passes into morbid action, the balance of circulation being readily disturbed by external and internal — by physical and mental, causes. In the article referred to, I have stated the connection often existing between congestions, general and local plethora, local determinations, and inflammations. Congestions and local plethora are frequently dependent upon the state of the venous circulation; and this upon obstructions in the liver, lungs, or heart; the efforts made to propel the blood in the capillaries, particularly under the influence of stimuli, readily inducing inflammation, especially of an asthenic kind. These states of vascular fulness, thus originating and predominating in the veins, are most common in persons advanced in life. On the other hand, local determinations of blood proceed chiefly from capillary expansion and arterial action, without venous obstruction; are most commonly observed in the young and those in the prime of life; and most frequently pass into the sthenic forms of inflammation.

98. But there are other states of the vascular system, upon which as much, probably, depends, not only in disposing to, but also in exciting, morbid vascular action, as upon vascular fulness; and to which very inadequate attention has been paid. These are the accumulation of effete and hurtful materials or elements in the blood, owing to imperfect depurating function. When the excreting functions of the kidneys, of the skin, of the liver, and even of the large bowels, are inadequately performed, the excess of hurtful, highly animalised, and irritating substances in the blood, as urea, &c., both predisposes to, and excites, inflammation in parts most susceptible of this cause of irritation, from previous disorder, or peculiarity of structure, or function. Irritating matters also may be carried from the digestive organs, or other parts, into the blood, where they may act in a way similar to those just mentioned. Thus inordinately exciting articles of food or drink, accumulated excrementitious matters in the biliary organs and intestinal canal, and morbid secretions pent up in any part of the body, are often absorbed into the circulation, and produce inflammations, varying in character with the kind of morbid matter producing it. (See art. ABSORPTION.)

99. *g.* The *influence of the digestive organs* in the production of inflammations has been acknowledged, since it was insisted upon by JOHN HUNTER. But it is very probable, that the disorder of these organs, thus predisposing to inflammations, and the predisposition itself, are associated effects of deranged organic nervous influence. There can be no doubt, however, that when the functions of the stomach and bowels are disordered or impaired, and when the liver is torpid, and accumulations of bile are formed in the biliary ducts or gall-bladder, a predisposition to inflammations is not only thus induced, but also a greater tendency to asthenic action is thereby generated. The state of the digestive organs often indicates the degree of organic nervous power attending upon the disease; whatever deranges their functions, or aggravates existing disorder in them, increasing the general and local affection, and changing sthenic to asthenic action. The disorder induced in the organs of digestion generally extends to the organs of excretion, not only by the direct sympathy arising from nervous endowment, and from the dependence of both classes of organs upon the same nervous influence, but also by the changes produced by the former in the circulating fluids,— the predisposition to morbid vascular action being accordingly heightened.

100. *h. Mental emotions* also favour the occurrence of inflammation, when excessive. Violent fits of passion may even excite the disease, particularly in the brain, liver, or heart. The depressing passions, when extreme or of long continuance, induce the more chronic or asthenic states of morbid action, or cause the sthenic disease to assume either of these forms. The exhaustion consequent upon protracted or excessive nervous sensibility, and upon pain, has a similar effect. When pain is very violent, it seems to act like to concussion of the nervous masses or of the body, and to severe crushing injuries or wounds: — they all depress organic nervous power, and, when inflammation takes place, give rise to an asthenic or spreading form of the disease.

101. *i.* A predisposition to inflammations is often inherent in the frame from *hereditary conformation* or temperament (§ 93.), and from *previously disordered states* of certain organs or tissues. Parts which have been formerly inflamed are most prone to experience a recurrence of the disease. Organs which are liable to simple excitation, or to actively increased function, are generally much disposed to the different grades of sthenic inflammatory action; whilst those which are torpid, debilitated, or exhausted, are most prone to the asthenic states. Persons whose mental faculties have been inordinately exercised, are most disposed to inflammations of the brain and their consequences; and

those who have over-excited or exhausted the digestive organs, by too much or too rich food, and by intoxicating liquors, are most liable to inflammatory affections of the stomach, liver, and bowels.

102. *k.* The influence of *temperature, season, and climate* is shown, not only by their favouring the appearance, but also by their modifying the characters and forms, of inflammations. High ranges of atmospheric heat produce inflammations of the liver, stomach, and brain; and, if heat be conjoined with humidity, these diseases assume a low or asthenic form, the bowels being frequently also affected. Prolonged high temperature, especially when aided by humidity, changes the state of blood, affects the biliary functions, and imparts a peculiar character to inflammatory diseases. Thus in autumn, after hot summers, these maladies are frequently associated with marked gastric or bilious disorder; and in winter and spring, when the air is cold and humid, they often present an erysipelatous or catarrhal form. A cold and dry state of the air is generally wholesome, if due exercise be taken; and, without favouring the occurrence of inflammations, imparts to them an acute and sthenic character, the respiratory organs being the most liable to be affected. But there are other conditions of the air, or prevailing atmospheric constitutions, which dispose to inflammations, and bestow upon them, for a certain period, peculiar forms or features. The sources of these have not been ascertained, although they may probably be referred to electrical states and terrestrial emanations. However these prevailing constitutions may arise, there can be no doubt of their influence on inflammations, and of the necessity of ascertaining their nature and effects, as being requisite to an appropriate and successful method of cure.

103. From what has just been advanced, the influence of *climate* on inflammatory diseases may be partly inferred; for as the climate partakes the most of either of the foregoing characters, so will these diseases be prevalent or be modified. In cold, variable, and humid climates, inflammations of the respiratory organs, and the rheumatic and scrofulous diathesis, are most common. In warm humid countries, inflammatory action appears chiefly in the liver, digestive canal, and spleen; and especially when exhalations from the soil also come into operation, it either assumes, or rapidly passes into, asthenic forms.

104. It should be kept in recollection that several of these *causes of predisposition* sometimes act conjointly; that they may be sufficient of themselves to occasion inflammation, although they generally require the more efficient or determining action of the *exciting causes* next to be considered; and that as most of them either continue in operation during the disease, or are inherent in the constitution, *they exert a very marked effect upon the form, progress, and consequences of the disease.* Hence the necessity of ascertaining them fully, and of appreciating them correctly, in order to treat with success the disease they are concerned in causing.

105. ii. The EXCITING CAUSES are very numerous and diversified, but uncertain in their operation, or ascertained with great difficulty. — Many of the predisposing causes, owing to their more intense or combined action, sometimes of themselves produce inflammation; and in such cases, the effect does not always appear in very obvious connection with its real cause. In many instances of visceral inflammation, the exciting cause is very obscure, the disease proceeding rather from a combination of circumstances, — some of them of fortuitous occurrence, — than from any one very obvious agency. The more direct causes may be considered with reference to their *mode of action* in producing the morbid effect: — 1st, Certain of them act by injuring the organisation; — 2dly, Some excite the organic nervous sensibility of the part, and, consecutively, vascular action in it; — 3dly, Others operate by affecting the function and circulation of the organ; inflammation resulting from those alterations in connection with predisposition; — 4thly, Many produce a specific or truly morbid action in the part, changing the organic nervous sensibility, the vascular action, and all the vital conditions, both locally and generally; — 5thly, Morbid matters secreted by an organ, or carried into the blood from a diseased part, may occasion inflammation by their direct effect upon the capillary vessels, as well as in one or other of the above modes; inflammation of one part thus giving rise, by means of some one of its consequences, to inflammation of another; and the morbid secretions from one organ inflaming others, with which they come in contact.

106. *A. The causes which act by injuring the organisation* are chiefly all external injuries, which divide, lacerate, or bruise a part. — Structures cleanly divided by a very sharp instrument are much less disposed to inflame, than those which are lacerated, bruised, or punctured. — *Lacerated parts* undergo much greater injury of organisation than simple division; their nervous fibriles and vessels are torn, and both these constituents of structure are thereby severely affected, the vitality of the part being often either directly or consecutively destroyed, and sloughing frequently taking place. — Violent *contusions* sometimes so disorganise a part as to prevent it from recovering any share of vital action. It then soon dies, and is cast off, or the system sinks under the shock primarily experienced, and the depression consecutively caused by the extent of local mischief, without inflammation having been fully developed. When contusions are slight, they recover without inflammation taking place; but when the capillaries are injured, or when their contents have partially escaped into the tissues of the part, or even when their tone is so much exhausted as to admit of much effusion, and especially when the cohesion of the textures has been more or less altered or overcome, inflammatory action is very liable to occur, although it does not necessarily take place. — *Punctured wounds* readily induce inflammation, and generally in proportion to the bluntness of the instrument. A triangular or round instrument also produces it more readily than a flat and sharp one. The disposition to inflammation from punctured wounds chiefly depends upon their extent, upon the nature of the structures which are implicated by them, upon the quantity of blood effused in the parts which they have penetrated, and upon the state of the constitution. Punctures of tendons, nerves, capsules, and aponeuroses, are much more injurious than of other parts; and the constitutional affection, in relation to the local injury and resulting inflammation, is very much greater. When much

blood is effused without a sufficient outlet, the punctured part being distended by it, and when blood is effused at the bottom of the wound, or in surrounding tissues, inflammation readily takes place, this fluid usually exciting inflammation in parts to which it is naturally foreign. The effects frequently also depend upon the nature of the body by which the puncture has been made. The teeth, claws, spurs, and spines of animals and fishes, generally produce very severe and even dangerous injuries, the punctures inflaming readily and rapidly, although no poisonous fluid has been inserted in them.

107. *Concussions* or severe shocks are often followed by inflammation. The parts which suffer from this cause are chiefly the brain, the spinal chord, the liver, and spleen. It is not only organic nervous power that is dissipated or exhausted in such cases, but the organisation is often more or less changed — minute lacerations of structure, or of capillary vessels, and consequent effusions or ecchymoses, being often found. The suspension of the functions caused by concussion is remarkably prone to pass into inflammatory reaction, when this species of injury does not altogether extinguish them. — Severe or prolonged *pressure* of parts often causes an asthenic inflammation of them, quickly passing into ulceration or gangrene. The *removal* of a gradually increased or continued pressure is often followed by a local and general inflammatory reaction, which in some cases, and as respects certain structures, becomes very acute, as in the peritonitis consequent upon parturition, and upon tapping dropsies of the abdomen. — *Ligatures*, or other causes of constriction, act by impeding the venous circulation; and various *positions* have a similar effect. They also aggravate inflammation when otherwise produced.

108. Various substances affect the organisation of a part, so as to induce inflammation, especially *mineral substances*. When these are applied in concentrated states, they destroy the organisation, inflammation appearing around the injured part. The pure alkalies, the strong acids, and certain of their salts, have this effect. But in weaker states, they inflame the tissues in the mode next to be considered (§ 109.). The bichloride of mercury, arsenious acid, &c., in an undiluted state, decompose or destroy the vital cohesion of the part; but in a weaker state they affect the organic sensibility and vascular action, thereby causing inflammation, and certain of its consequences. — *Extremes of temperature* affect the organisation almost directly, although in less grades; they act chiefly in the manner just mentioned.

109. *B. The causes which excite the organic nervous sensibility and the vascular action of the part*, are all those substances which are classed as stimulants or irritants. They act directly, and chiefly, on the parts to which they are applied. Inflammations of the skin, intestinal canal, urinary organs, and even of the respiratory passages, generally proceed from these sources. Prolonged friction, flagellation, the application of any of the above substances to the skin, or the ingestion of them into the stomach, and high ranges of temperature, produce inflammation in this way. Volatile or diffusible stimulants, irritating gases, and fine particles of mineral or vegetable substances, floating in the air, often inflame the respiratory passages. The atmospheric air, especially the oxygen of it, frequently inflames parts whose organisation is not suited to exposure to it. When the serous membranes of shut cavities are exposed to the *air*, they first become dry; afterwards more vascular than natural; and ultimately covered with a thin exudation of lymph, varying in thickness, and in the proportions of serum and coagulable albumen, with the intensity of vascular action, the constitution of the patient, and the powers of life. Mucous surfaces deprived of their epithelium, the skin without its cuticle, and other exposed or divided textures, are similarly affected; inflammation frequently supervening, unless when the lymph thrown out coagulates over them, and completely protects them from the air; and then the process of restoration usually takes place underneath the protection thus formed. Stimulating substances may be taken into the stomach, and pass from it into the circulation, without materially affecting the digestive organs, and yet they may inflame the organs by which they are excreted. Thus, cantharides and turpentine cause acute nephritis; and spirituous liquors, and the prolonged exhibition of iodine, excite chronic inflammation and organic lesion of the kidneys, giving rise to dropsy. Low ranges of temperature also sometimes occasion inflammation — not, however, by directly exciting the nervous influence and vascular action, but by remarkably depressing both, in the first instance; the consequent reaction proceeding to an excessive, severe, or prolonged state of inflammation. (See arts. Cold, and Gangrene.)

110. *C. The causes which affect the functions and circulation of an organ, aided by predisposition*, are numerous, and, like the preceding class, hardly admit of enumeration. Whatever inordinately excites the natural actions, and thereby the circulation of an organ, or whatever primarily stimulates the vascular action of a part, will frequently occasion inflammation of it; for the increased function or circulation will run on to inflammatory action, whenever a strong predisposition is present in the organ or constitution. The energetic actions of the brain are attended by augmented circulation, which may pass into inflammation. Increased function of the liver is often followed by inflammation of it. Excessive indulgence of the appetite and excitement of the stomach often precede some of the forms of gastritis or enteritis. In these cases, the natural actions are first inordinately excited, and morbid vascular action is thereby induced. But, in other instances, the order of morbid procession is reversed: the causes increase the circulation in the organ before the function is materially deranged. Thus *cold*, instead of benumbing sensibility, and of giving rise to a morbid vascular reaction upon its removal, in external or other parts on which it acts, often determines the momentum of the circulation upon internal viscera and surfaces; and if these be not partially relieved from the load or congestion thereby occasioned, by a free exercise of their functions, inflammation is a frequent consequence. Interruption of the exhalation from the skin, constriction of the surface, and diminished circulation both there and in the extremities, combine to drive the blood upon the mucous surfaces, and parenchymatous viscera; increased function, augmented secretion, or morbid vascular action resulting therefrom, according to the states of constitutional power or of predis-

position, and to the continuance or intensity of the cause. When cold is not protracted or intense, relatively to the constitutional energy and predisposition of the individual, the internal functions, especially those of digestion, and of excretion, the urinary particularly, are increased, and inflammatory action does not take place; but when the internal determination is not relieved by augmented secretion, nor removed by a restoration of the circulation to the surface and extremities, inflammation of the predisposed organ is often the consequence. Sudden, continued, or frequent exposures to cold, vicissitudes of temperature, and partial exposure to currents of cold air, to humidity, &c., are the most common causes of internal inflammation, and especially of the respiratory organs. As respects these organs particularly, it is not the sedative influence of cold, acting upon exhaling surfaces, the seat of active organic functions, but the reaction consequent upon the removal of this influence, that occasions the inflammation; the primary influence of cold only disposing the part to inflame, when reaction takes place, or modifying the reaction, so as to cause it to run on to inflammation. Hence it is that persons, after going into a cold air from a warm apartment, generally escape inflammation of the air-passages, unless they be perspiring, or the predisposition to inflammation be strong, when they avoid a sudden return to a high temperature, by which reaction is liable to be morbidly increased; and hence the greater danger from exposure to much warmth after the prolonged or intense influence of cold, than from the cold without the subsequent injurious action of heat.

111. *D. The specific causes of inflammation*, whereby the organic nervous sensibility, the vascular action, and all the vital conditions are truly morbidly altered, both locally and generally, comprise all infectious, contagious, and contaminating matters, particularly when applied to an abraded surface or wound. Most of the substances forming the second and third classes of *infectious agents* (see art. INFECTION, § 4.), and arranged also under the head of ANIMAL POISONS (see that article), produce inflammation, presenting one or other of the local and general forms described under the asthenic species (§ 54. *et seq.*). The secretions and fluids of one person may excite inflammation when applied, as just stated, to another; but the effect is more certainly produced when these matters are taken from the dead body, and especially when they are the product of inflammatory or other disease. The serous, puriform, sanious, or sero-puriform fluids generated by specific or constitutional maladies, and by diffused inflammations of the peritoneum, or even of other serous surfaces, possess the property of exciting the asthenic or diffusive forms of inflammatory action in a very remarkable manner. The most dangerous effects generally follow the inoculation of these fluids from the recently dead, or from the still warm body, or even the application of them to the skin. The next most noxious effects result from the introduction of animal matter in a very far advanced stage of putrefaction. In both cases, but in the former especially, the constitutional affection is most severe (§ 59.). Even when the local injury is hardly to be perceived, as well as when it is more manifest—vesicles or pustules arising in its vicinity—inflammation extends through the cellular tissue in the course chiefly of the lymphatics or veins, sometimes implicating these vessels, and abcesses form under the muscles, particularly under the pectoral and other muscles of the chest; a great part of the cellular tissue on the trunk, and even the serous surfaces underneath, becoming implicated in the disease. Occasionally the inflammation presents the characters of some one of the varieties of *erysipelas*; the particular form of the local, as well as of the general affection, depending upon the constitution and previous health of the patient, and upon the nature or properties of the animal poison. The most virulent of the morbid poisons seems to be the fluid effused in the large cavities, and particularly that found after puerperal peritonitis, in recently dead bodies. The recent brain, the substance of fungoid, carcinomatous, and medullary tumours, and the sanious fluids proceeding from diffusive, erysipelatous, and gangrenous inflammations, are also frequently productive of most noxious effects.

95. Although the most dangerous form of inflammation is caused by the fluids of the recent human subject, yet those of recently killed *animals* produce no such effect. This probably arises from death being caused in the former by disease, in the latter by bleeding, during a state of health. When, however, the fluids of animals which are either diseased or under the influence of inordinate excitement, or of its more immediate effects, are applied to a wound or denuded surface, the effects are often severe, although not so dangerous as in the former cases. (See arts. INFECTION, and POISONS — *Animal*.)

112. iii. CONSECUTIVE INFLAMMATIONS.—*Morbid matters secreted by an organ, or circulating in the blood, frequently produce inflammation of either neighbouring or distant organs.* — This is an important class of causes, and, like that immediately preceding, generally occasions the asthenic or diffusive forms of inflammation. When the natural secretions of an organ are rendered unusually morbid or irritating, either from perverted action, or from the accumulation of noxious elements in the blood, the canals through which they pass are often irritated and inflamed by them. The morbid bile formed during affections of the liver, or in the course of gastric, bilious, remittent, and continued fevers, often occasion the enteric or dysenteric complications occurring in these diseases. Inflammations of the colon and rectum also often arise from this cause, as well as those of the gall-bladder and bile-ducts. The secretions on the surface of the skin, especially when allowed to accumulate and remain on it, are the most frequent causes of cutaneous inflammation; and alterations of the urine often occasion inflammation of the urinary bladder. Indeed, most of the complications appearing in the course of febrile diseases, arise either from the morbid state of the secreted fluids, or from that of the blood itself; the organic influence being remarkably susceptible of their impressions, and the vascular system being readily excited by them to an increased action, devoid of power or healthy tone. When vital power or organic nervous influence is extremely depressed, as in adynamic, typhoid or exanthematous fevers, the parts with which diseased secretions come in contact are unable to resist the impression made by them, or to throw them off by means of a healthy secretion from their own surfaces, and by sthenic muscular action. Hence, this impression is soon followed by asthenic inflammation.

113. Morbid matters may also be *absorbed* from mucous surfaces, from hollow organs, or from the more solid structures in which they have been formed, and be carried by the lymphatics to glands, and even into the veins and general current of the circulation; and they may, moreover, be formed on the internal surfaces of the vessels themselves, contaminating the blood in either case, or altering it in such a manner as to excite inflammation in various different and distant organs. Sanious or morbid fluids may be taken up from the cavity of the uterus; and, passing into the veins and blood, occasion phlebitis or other forms of malignant puerperal disease. Morbid secretions in the intestinal canal may be absorbed and carried into the blood of the vena porta, and excite diffused or other forms of hepatitis; these results taking place the more readily, the more unhealthy the secretions are that are accumulated in these situations, and the more depressed the vital powers.

114. iv. SECONDARY INFLAMMATIONS.—Morbid matters, also, from *primary* inflammations, may excite *secondary* inflammations, — 1st, In the course of connecting cellular tissues or membranous surfaces; — 2dly, In lymphatics and absorbent glands; — 3dly, In veins; — 4thly, In parenchymatous viscera; — 5thly, In synovial capsules, &c.; — and, 6thly, In serous or mucous surfaces. The secondary disease, in either of these situations, is most frequent when the morbid matters from the primary inflammation are effused in the substance of a part without being confined or limited by a barrier or cyst formed by coagulable lymph, and when organic or nervous power is much depressed. — *a*. The *mode* in which the consecutive or secondary disease is developed, is different in most of these situations, and is perhaps doubtful as respects some of them. When the primary inflammation of *membranous surfaces* or of *cellular or adipose tissues* is asthenic, it is not only disposed to extend in every direction without any break or interval, but it often advances to distant or even remote parts, without the intervals presenting any manifest change, and after various intervals of time. Several states of erysipelas and diffused inflammation of the cellular tissue, and of mucous and of serous membranes, illustrate this. When the extension of the disease is continuous, the nature of the tissue, and the infiltration of the fluids from the primary inflamed part, are the chief causes of it, in connection with weak powers of resistance; but when a part opposite to, or adjoining, an inflamed surface also becomes inflamed, without the intervals between both being affected, the cause will generally be found to have been the fluids effused from the part first inflamed, which have acted as excitants or irritants of the healthy parts with which they have come in contact. Inflammations of serous, cutaneous, and mucous tissues frequently illustrate this fact. When distant parts are secondarily affected without admitting of this explanation, we can only infer that, as long as constitutional disease exists, so long will it continue to manifest itself locally or externally, or in some part or other of the same tissue which it is most disposed to affect, or in some other predisposed part.

115. *b*. In several asthenic, specific, and chronic states of inflammation, the morbid matter absorbed from the primary seat of disease inflames chiefly either the *absorbents* or the *glands*, or both the *lymphatics and glands*; the former often in their whole course, from the primary lesion till the glands are reached, the latter principally in the groins, arm-pits, and neck.—In either case, the connecting and surrounding cellular tissue is also inflamed, small abscesses are formed, or a diffused infiltration of a sero-puriform, sanious, or ichorous matter takes place in their vicinity, especially around the glands; and the disease is thus complicated and prolonged. The constitutional powers in these cases, are affected more and more seriously, owing to the effect produced either upon the organic nervous influence, or upon the vascular system and blood itself, or to these causes combined; but the local, and especially the general, disease presents characters having more or less reference to the primary or exciting cause, from which indeed it derives its specific characters, as when inflammations are caused by a specific animal poison.

116. *c*. The *veins* are often the seat of the consecutive inflammation, especially after the primary asthenic forms of the disease, or when the powers of life are depressed, — when the fluid products of inflammation are effused upon wounded or divided surfaces, or are insufficiently confined by the effusion of coagulable lymph, or by cysts, — and when morbid secretions remain long in contact with absorbing surfaces, or in situations where venous imbibition may take place, as in the cavity of the uterus after delivery, and on divided surfaces after amputations and other surgical operations. In these cases, the consecutive phlebitis assumes various characters, according to the constitutional powers of the patient. If the vital powers be not materially reduced, coagulable lymph is thrown out upon the internal membrane of the veins, and the blood is thereby coagulated in them. The circulation through them is thus arrested, and the products of inflammation are prevented from mixing with the mass of blood. In such cases, the inflammation sometimes extends to the more external coats of the vein, and small abscesses form externally to them, and press upon and obliterate their canals; the obstruction to the circulation in them thus occasioned, further preventing contamination of the fluids. In other cases, purulent matter is secreted within the vein, and is partially confined either by coagula or by albuminous exudations on the internal surface of the vessel, or by both; and, in some instances, even when these have been formed, the puriform matter has evidently mixed with the blood without coagulating it. When pus has been found in the centre of coagula, it is extremely probable, that it has caused the coagulation of the fibrinous portion of the blood in the partially obstructed vessel, and has thus become inclosed in the coagula. When the powers of life are extremely depressed, the secondary phlebitis is not limited by an effusion within the vessels of coagulable lymph, with or without pure pus, and by an extension of the inflammatory action to the external coats and connecting cellular tissue, as in the above states of the disease, but is rapidly extended along the internal surface of the veins; the morbid secretion from the surface not consisting of coagulable or healthy lymph, or even of pus, but of a sero-puriform or of a sanious or ichorous fluid, which is not capable of coagulating the blood in the inflamed veins, but which readily

mixes with it, and contaminates it, thereby producing all the phenomena of adynamic or malignant fever. (See art. VEINS — *Inflammation of.*)

117. *d.* Inflammations of *parenchymatous or other viscera* are often *secondary or consecutive* upon primary inflammation of remote or external parts. The brain, the lungs, liver, and kidneys are most frequently thus remotely affected. In these cases, there may be extensive inflammatory appearances without purulent collections; but most frequently one or more purulent collections, or distinct abscesses, or merely puriform infiltrations of the inflamed parts, are observed. In some instances, the puriform collections and infiltrations are attended either by very few marks of inflammatory action, or by almost none, so as to render it even doubtful, whether they have resulted from inflammation, or from a simple deposition, or separation, from the capillaries of the secondarily diseased part, of the morbid fluids absorbed into and circulating with the blood. I believe, however, that, in these cases, the morbid matter in the blood excites a sufficient degree of inflammatory irritation of the capillaries of this part, to form the diseased secretion infiltrating it; and that, as in other instances where inflammation has unequivocally existed during life, the principal indications of it, in the affected tissues, have vanished soon after death.

118. When secondary inflammation seizes upon a parenchymatous organ, remote from that primarily affected, it will generally be found that it is owing to the passage of the morbid fluids from the primary seat of inflammation into the blood, these fluids consecutively inflaming the parts most predisposed. In some cases the secondary disease has been preceded by, and is associated with, phlebitis; in others, this complication cannot be detected. Even in cases of primary, as well as of consecutive phlebitis, secondary inflammations of internal viscera, with purulent collections or infiltrations, are very frequent. But this subject is fully discussed in the articles ABSCESS, and VEINS.

119. *e.* Consecutive inflammations of *synovial capsules*, and in *serous surfaces*, are observed chiefly in similar cases and circumstances to those just described (§ 115. 118.), — when the blood contains morbid secretions, or when the veins are inflamed and the powers of life much reduced. The former of these structures are often affected by the contamination of the fluids consequent upon syphilis, and upon the subsidence of confluent small-pox; the latter in the advanced stages of diffusive inflammation of the cellular tissue, or of phlebitis, or of inflammation of the lymphatics, particularly when either disease extends to the trunk. It also is sometimes consequent upon extensive burns or scalds, especially when the surfaces over the large cavities are primarily inflamed by these accidents.

120. *f. Mucous surfaces* are secondarily inflamed, both by the passage of the fluid products of primary inflammation over them, as when laryngitis or bronchitis supervenes upon an ulcerated cavity in the lungs, and by the absorption of these products into the blood. These surfaces, especially those of the large bowels, perform an excreting, as well as a secreting function, and the morbid matters, in the course of their elimination from the circulation, excite inflammatory action, generally of an asthenic form, not only in these surfaces, but also in other organs performing similar offices, as the kidneys, liver, &c. Thus secondary inflammation and ulceration of the large bowels, kidneys, &c., often occur in the course of tubercular excavation and ulceration of the lungs, and of abcesses in the liver.

121. VI. PROGNOSIS.—The prognosis of inflammation can be stated only in general terms. The more special circumstances connected with this subject must necessarily be considered in the articles devoted to the inflammations of particular organs and textures; for the result will mainly depend upon the organ affected, as well as upon the form, severity, and stage of the disease, and upon the consequences which may have already taken place.

122. *A. As to the organ or structure affected*, it is unnecessary to state more than that the danger of inflammations is great in proportion to the vital importance of the affected part. Acute inflammations of the stomach, of the intestines, of the lungs, of the heart, of the brain, of the liver, and of the kidneys, are all attended by more or less risk, owing to the disturbance of function attending them, to the shock which the whole frame experiences from the attack, and to the consequences and changes of structure, or the disorganisation, which they often occasion. Yet the danger is still greater when the *blood-vessels*, whether arteries or veins, are inflamed; for the products of the morbid action are then liable to mix with, and to contaminate, the blood, and thereby to infect, in a very dangerous manner, the whole frame. — Inflammations of *serous membranes*, particularly at advanced stages, and in unhealthy subjects, are always attended by great risk of life; for the fluids effused by the disease either accumulate to a fatal extent in the shut cavities they form, if effusion be not early prevented or restrained, or agglutinate their opposing surfaces, so as to impede the functions of parts and to occasion dangerous consecutive disease. Much, also, of the risk attending inflammation of parenchymatous organs proceeds from the extension of the disease to their serous surfaces, and from the effusion consequent thereon. — Inflammations of *mucous surfaces* are much less dangerous than those already mentioned; and chiefly because the secretions which they produce favour a resolution of the morbid action, and are thrown off the diseased surface, — a source of irritation being thus removed. They often, however, occasion great risk to life, by the extent of surface affected, and by the disturbance of the functions performed by it, as in cases of universal bronchitis, where the changes produced by the air on the blood are impeded both by the disease, and by the morbid secretion produced by it. Inflammation may also extend from these surfaces to adjoining structures; the substance of vital organs, and even their serous envelopes, becoming extensively implicated, and the danger proportionately increased. — The *consecutive*, and particularly the *secondary*, *inflammations* described above (§ 112. 114.) are always most dangerous.

123. *B. The form and severity of the inflammation* necessarily influence the prognosis. — In general the *asthenic forms* are much more dangerous, other circumstances being the same, than the *sthenic*. Yet a very acute sthenic state of the disease, especially of internal viscera, may be as

rapidly fatal as any other, — the intensity of the morbid action soon exhausting vital power, and superinducing the more unfavourable consequences and terminations already described, especially copious effusion, suppuration, gangrene, &c. — The asthenic states of inflammation, even in external and non-vital parts, are seldom devoid of danger, unless they are early subjected to a most judicious treatment; for they generally originate in unfavourable circumstances: either the constitution of the patient is impaired, and the assimilating and excreting functions are weakened; or the causes which produced them are poisonous, contaminating, or infectious. Their diffusive or spreading character, generally arising out of these circumstances, increases the risk, not merely from the extent of the diseased state, that results, but also from the contamination of the circulating fluids that often takes place, and the consequent depression of the powers of life.

124. *C. The age, strength, previous health, diathesis,* and *habits of the patient,* are concerned, not only in favouring the production and the character of the inflammation, but also in modifying its course, consequences, and terminations.—Early age, strength of constitution, and previous good health, are generally favourable circumstances, in respect both of the form and result of the disease. Yet, in very robust and plethoric persons, accustomed to active exercise in the open air, and in the habit of drinking largely of malt or spirituous liquors, inflammation is apt to assume a most intense form, rapidly terminating in gangrene, effusion, or abscess. Inflammations of previously weakened or diseased organs, or of parts which have formerly been the seat of inflammation or congestion, and in the scrofulous, gouty, or rheumatic diathesis, are more or less unfavourable, particularly if affecting internal viscera; and, even in the mildest forms, are managed with great difficulty. — The habits and modes of life of the patient remarkably influence the prognosis. Persons who live temperately and abstemiously, and particularly those who partake of little animal food, and who abstain from stimulating beverages, are seldom subject to severe or dangerous inflammation On the other hand, persons who live grossly, who eat much animal food, and who drink much malt and spirituous liquors, experience the most severe and unfavourable forms of the disease, — especially if they are engaged in sedentary occupations, or take insufficient exercise.

125. *D.* It is obvious that inflammations are more unfavourable in *an advanced stage,* than when they come under treatment at an early period. But the degree of danger will depend chiefly upon the consequences to which they have already given rise, and to the seat and form of, and other circumstances connected with, the attack. The *extent* and exact *condition* of the local affection, and of the *effusion* which has taken place; the extent to which the functions of the affected organ are impeded; the commencement or presence of *suppuration,* or the imminent risk of *abscess;* the state, severity, and character of *the constitutional affection;* the degree of disorder manifested by the digestive, excreting, circulating, and nervous systems; and the state of the vital powers, — must all be taken into account, and an opinion formed conformably with the conditions they severally present: for, in proportion to the progress of the disease, and of any of its consequences, and to the amount of disorder manifested by the constitution generally, or by a vital organ in particular, will the risk of an unfavourable issue be great, especially if an internal viscus be the seat of inflammation. The degree in which the cause of the disease may operate during its continuance, should also influence an opinion as to the result; for it is obvious, that persistence of the causes will increase and prolong the effect, and render the consequences more unfavourable, than when the causes have been removed. (See arts. Abscess, Adhesions, Gangrene, and the articles on diseases of the individual tissues.)

126. VII. Theory or Nature of Inflammation. — The various states of inflammation cannot be satisfactorily considered without reference to the structure and vital relations of the arterial and capillary vessels; and, indeed, of the vascular system generally. — *A.* The *external* or *cellular coat* of arteries is more dense than common cellular tissue; and hence it rarely partakes of the serous infiltration of this tissue. It sometimes, however, is the seat of inflammatory exudations, particularly of coagulable lymph; and it occasionally contains a small quantity of pus, and more rarely of extravasated blood. It possesses the greatest degree of tenacity of any of the coats. — The *middle* or *fibrous* coat is highly elastic, particularly in the circular direction of the fibres, and consists of a substance in all respects resembling the elastic ligament of the spine. The fibres composing this tunic are connected by fine cellular tissue, but are easily separated by the pressure of a ligature. This coat is most developed in the large arterial trunks, and most subject to the impulse of the heart; it almost disappears in the smaller arteries, and entirely in the capillaries. The elastic power which it exerts, keeps up a continued pressure on the column of blood in the arteries; diminishing, however, with their size, until it nearly ceases in the capillaries. This elasticity accommodates the vessels to the quantity of blood passing through them, and facilitates the circulation by the pressure and reaction exerted on their contents. — The *internal* or *membranous coat* is highly polished on its internal surface; is transparent; and, although it resembles the finer serous membranes, it is more friable on pressure, and yet more elastic, than they.

127. In the finer arterial branches and capillary vessels, the fibrous or middle coat of the arteries disappears, so that these vessels seem to consist only of membranous canals, surrounded by cellular tissue. The muscularity and irritability of these vessels, although the subjects of so much discussion from the days of Vacca and Haller, are mere figments, which now deserve not the least notice. The muscularity does not exist, and the irritability is merely simulated by the changes consequent upon the application of agents which affect the organic nervous influence, and vital contractility of the tissues and capillaries.

128. The *nerves* which supply the arteries and capillaries are chiefly ganglial, or derived from the organic or sympathetic system. But filaments from adjacent parts of the cerebro-spinal nervous system communicate with them. Ganglial nerves have been traced around the arteries as far as the interior of the cranium, and the principal arteries

of the extremities, by Weber and the author, in 1816 and 1817, and more recently by Ribes and others; and there can be no doubt that they extend even to the capillaries, endowing these vessels with influence, and with the properties evinced by them in health and disease.

129. The *vital states* which arteries and capillaries manifest, especially when influenced by stimulants, or depressants, are these: — 1st. Of turgescence, dilatation, or enlargement; — 2d. Of contraction or constriction; and, 3d. Of healthy or natural tone. — The first and second are anormal states, the third normal, and consistent with all the natural functions. It is to the *first* of these that attention is principally to be directed in discussing the nature of inflammation; but, before this state is considered, a very few remarks may be offered on the others particularised.

130. *a.* The *constriction* of arteries and capillaries arises chiefly from agents, which increase the vital contractility of tissues. Many of these agents are of very opposite natures, and yet they act, particularly in certain grades of activity, and periods of operation, in definite modes. Cold, fear, and other depressing passions, severe injuries, shocks to the system, &c., contract parts susceptible of organic contractility, especially the skin; arterial, capillary, and venous canals; cellular and serous tissues, &c. &c.: but, if the operation of these agents is intense, or long continued, the natural tone of the contractile tissues and vessels is impaired, and vital exhaustion or relaxation ensues. A similar constriction of these parts follows the application of astringents and refrigerants; the sudden diminution of the circulating fluids, as by hæmorrhage or venæsection; and the depression of vital power by whatever cause. The contraction of arteries and capillaries soon after death depends chiefly upon the weakened injection of blood into these vessels, just before dissolution, and to the entire cessation of the action of the left ventricle. The organic or vital contractility of arteries and capillaries is then no longer antagonised by the action of the ventricles upon the column of blood they contain, and is consequently allowed to advance to the utmost permitted by the fibrous and cellular coats; the arteries, and even the capillaries, being consequently found nearly empty and constricted after death. But as contractile parts lose their rigidity or tone with the incipient decomposition of the structures, the vessels afterwards relax, so as to allow a larger column of fluid to be injected through them than in the living state.

131. *b.* In the *healthy* or *natural tone* of contractile tissues, the arteries, capillaries, and even the veins, fully participate. Still this natural state of the vessels is liable to various deviations or deflexions, either to the side of turgescence, or to that of constriction, without amounting to what constitutes a truly morbid condition. Numerous causes produce either constriction or turgescence, without reaching the pitch truly injurious. It is chiefly when the action of the causes is intense or continued; or when they alter, by their primary and specific influence, the vital properties of the sentient system and contractile tissues; that the effect becomes truly morbid, and diseased action is set up. Much, however, depends, in such cases, upon constitutional disposition, or the degree and kind of susceptibility existing at the time of exposure to the causes. Agents which produce no derangement in some persons, violently affect others; and the same cause, which was without effect at one time, may be most injurious at another, — owing to varying states of organic nervous energy and susceptibility.

132. *c.* The *state of turgescence, dilatation*, or *enlargement* of the smaller arteries and capillaries, although a part of the inflammatory act, does not alone constitute it. Something more is necessary to its unequivocal production. This state may take place without being at all morbid, — as in the excitement of erectile parts, in the development of the uterus and mammæ during pregnancy, in the enlargement of collateral vessels after the obstruction of a large artery, in the act of blushing, and in the rapid growth or restoration of parts. It may even be morbid, or at least the source of disorder, without constituting inflammation. The active congestions and determinations of blood to particular organs, although often passing into inflammation, yet are very different from it. In these vascular disorders, more or less turgescence, or dilatation, of the smaller arteries and capillaries, as well as of the smaller veins, obviously exists; but still this state is not attended by the same phenomena, and does not give rise to the same consequences, as are observed in the various forms of inflammation. This state of turgescence of the capillaries of inflamed tissues has especially fixed the attention of modern pathologists; and the question, with them, has been almost limited to the inquiry, as to whether the increased diameter of the capillaries is to be imputed to relaxation or debility, or to augmented action. The least material point of the many, which should have fixed their attention, has thus alone engaged the whole of it; and, whilst they have attributed every thing to one or other of these two conditions, they have entirely overlooked the fact, that they are both contingent or consecutive changes; that either may exist according to the stage and form of the morbid action; and that the one as well as the other may be present quite independently of, and without, inflammatory action.

133. The *state of the capillary circulation* in inflammation has been agitated since the commencement of the present century, and even at the present day, with a parade of useless, deceptive, and ill-conducted inquiry, dignified with the name of experiment. Numerous cold-blooded and other reptiles, and often animals, very differently organised from the higher species, have been tortured for evidence, whereupon an argument might be hung in behalf of preconceived hypotheses; and crude and puerile observations have been made the basis of doctrines, which have failed of attracting notice, either from having been imperfectly understood, even by their propounders, or from having been overlaid by the multitude of words, in which attempts have been made to convey them. Thus the author of a recent work, entitled "A Critical and Experimental Essay on the Circulation of the Blood," &c., not only derives his inferences from imperfect observations, made at similar sources to the above, but also, because he observed an oscillating motion of the blood in the aorta of a frog after tying the vessel, jumps to the conclusion that, "it would appear almost certain that the arteries

possess a muscular contractile power;" although the previous inquiry, as to the existence of a muscular structure in the coats of these vessels, that some honest observers might, perhaps, have thought necessary, had never been entered upon by the author.

> "Such reasoning falls like an inverted cone,
> Wanting its proper base to stand upon."

134. Before entering upon a fuller explanation of my own views as to the theory of inflammation, and which are essentially the same as were published at first, more than twenty years ago, and at several times subsequently, the opinions of some writers most deserving notice may be adduced; although, as respects inflammation especially, a rational explanation of phenomena, as they are subject to our senses, is to be preferred to a mere collection of opinions — of hypotheses; in many of which, parts only of the truth appear — the rest being either kept entirely out of view, or hid under an accumulation of loose analogies and inconsequent argument, or buried in heaps of unmeaning verbiage.

135. i. Opinions as to the Nature of Inflammation. — *A.* Inflammation was very generally attributed to vitiated states of the fluids, until Van Helmont ascribed it to an irritation which attracted the blood in a greater quantity than natural into the capillary vessels, — the irritation arising from an affection of the *archæus* or vital principle. Willis, notwithstanding his espousal of the chemical doctrine of the blood, attributed more to the local irritation of Van Helmont, in the production of inflammation, than to the morbid condition of this fluid. Towards the close of the seventeenth century, several theories of inflammation, and of disease in general, were promulgated. The followers of Des Cartes imputed inflammatory action to a fermentation excited by the æthereal fluid which they supposed the blood to contain, and which Des Cartes substituted for the *gas*[*] of Van Helmont. The opinions of Sylvius were merely modifications of those of the two pathologists just named, and an accommodation of them to the chemical doctrines of the day — acidity of the fluids performing an important part in his theory. Le Mort, Schneller, (*Theoriæ Mechanicæ Delineatio*, 8vo. Leyd. 1705.) and others, adopted the mechanical parts of the doctrines of Des Cartes, and associated them with certain chemical hypotheses not much more deserving of notice. They imputed inflammation to irritation caused by the æthereal particles of the fluids without any reference to other changes. The partial rays of light, furnished by the rising of chemical science in Europe, were soon employed to explain morbid actions; but they led, especially at first, to little more than to modifications of the doctrines previously adopted, and particularly of the humoral pathology, and never disclosed results deserving of lasting attention.[†]

136. Pitcairn, the master of Boerhaave, first opposed the chemical pathology then very generally received, and applied the mathematical doctrines promulgated in Italy by Borelli, Sanctorius, and Bellini, and still more widely disseminated by the classical work of Donzellini (*De Usu Mathemat. in Arte Medica: in Guilielmini Opera.* 4to. Genev. 1719. t. ii. p. 516.), to the pathology of inflammation. To those acquainted with the physiological and pathological views of Des Cartes, the mathematical doctrines of the Italian physicians will appear as a very obvious and easy application of mathematics to the mechanical parts of the pathology, of which this philosopher may be said to have been the founder. Although numerous modifications of the theory of inflammation were proposed by writers of the mathematical school, yet they may be generally referred to an *error loci*, or to the obstruction which they supposed to be occasioned by the passage of the larger sized globules of the blood into a smaller series of capillaries, intervening between the arteries and veins[‡], than are destined to receive them.

137. Boerhaave proposed a theory, which, if it was not altogether original, was at least an important modification of that of Pitcairn, and of the mathematical school. He supposed that the blood itself became more viscid, causing a *lentor* in its circulation through the several orders of capillary vessels, and an excessive engorgement of them; an increased action of the larger vessels, and flow of blood in them, taking place to overcome the resistance and congestion. The close resemblance of this hypothesis to others much more recently proposed, is very obvious. That the action of the larger arteries should be increased, where an obstruction to the circulation through the capillaries exists, may readily be conceded; but that the afflux of blood can be increased, and obstruction at the same time exist, is a contradiction in terms. In one essential point connected with the theory of inflammation, Boerhaave differed altogether from Pitcairn. The former supposed that a constriction of the

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[*] Carbonic acid and hydrogenous gases were partially known to Van Helmont, and this imperfect knowledge of gaseous fluids became the basis of several of his pathological views.

[†] The Dutch physicians at the end of the seventeenth century were amongst the chief writers on Pathology, and consequently on Inflammation; and the schools of medicine in Holland were acquiring a reputation, which rose with the commercial prosperity of that country. But it is not altogether uninteresting to remark how many of the medical writers in it, about this time, adapted their pathological views, as well as their practical precepts, to the promotion of the traffic of the people. The foreign trade of Holland, rising upon the decay of that of Portugal, Spain, Venice, and Genoa, furnished numerous articles of luxury, not only to the Low Countries, but also to all Germany, and the East of Europe. Many of the medical writers of the country brought them into general use; and, whether they imputed inflammation and other diseases to inspissation, or to acidity, or to alcalinity, or even to effervesence, of the circulating fluids, still tea, tobacco, coffee, and opium, in extraordinary quantities, were not only the chief remedies, but also the principal prophylactics recommended by them.

[‡] The mathematical school boasts of a numerous list of names eminent not only in medical, but also in mathematical, science and in art — of Guilielmini, Michelotti, Bernouilli, Baglivi, Perrault, Chirac, Quesnay, Hales, Mead, Sauvages, and others; and furnishes many splendid examples of the dignity, as well as of the aid, which general science has imparted to the study and practice of medicine. The mathematical doctrine of inflammation was founded on the belief, that the globules of the blood consisted of various sizes, and that the red globule was formed of six serous globules, and each serous, of six lymphatic globules; three orders of capillary vessels, suited to the conveyance of these globules existing between the arteries and veins. The obstruction caused by the passage of red globules into the wrong order of vessels constituted what they termed an *error loci*, and the cause of inflammation. — Whilst the Cartesians insisted much on the various forms of the globules and pores, the mathematicians contended chiefly for the different sizes of the globules and capillaries.

capillaries caused a congestion of blood and slower rate of circulation, whilst the latter considered that an increased diameter of the vessels had this effect. The great defects in the opinions of these physicians, independently of their incorrect views as to the conformation of the capillaries, and as to the constitution of the blood and blood-globules, were their entirely leaving out of consideration the power exerted by the organic nervous or vital influence upon the vessels, and upon the circulation through them; and their being unaware of the fact, that both constricted and enlarged capillaries, or other vessels, may have the circulation through them either accelerated or retarded, according to the state of that influence by which the capillaries, and tissues in which they ramify, are actuated.

138. Whilst the mathematical theory of inflammation and disease was evidently supported by, if it did not originate in, the philosophy of Newton, and was the first manifestation of the comparatively modern doctrines of solidism, the views of Hoffmann were more referrible to the system of Leibnitz, and a more complete adoption of the influence of the soft solids in the production of morbid actions. According to this celebrated pathologist, inflammation proceeds from spasm of the smaller vessels, which suspends or impedes the circulation in one part, and determines it inordinately to others, red blood being thereby propelled into capillaries, which in other circumstances admit only the serous portion of it; pain, swelling, and heat resulting therefrom. This theory soon found supporters; and, notwithstanding the already promulgated doctrines of his contemporary and colleague Stahl, these soon became numerous. Whilst the doctrines of Stahl and Hoffmann were dividing the schools of Germany, and especially that of Halle, where they were taught by these celebrated professors, the opinions of the mathematical pathologists and of Boerhaave were predominant in this country and in Scotland, until the lectures and writings of the elder Monro, of Whytt, and of Cullen, attracted notice.

139. The medical doctrines advanced in Germany at the close of the seventeenth, and at the commencement of the eighteenth, centuries, had more or less reference to the most generally received metaphysical views. The relations already noticed between the doctrines of inflammation hitherto adopted, and the pathology of Des Cartes, existed chiefly in respect of their more mechanical parts. But the psychological opinions of Des Cartes, and of his successor Malebranche, were not made the basis of a system of pathology until Stahl adopted them as such at a very early period of life. Perrault* had previously demonstrated the influence of mind upon all the bodily functions; but Stahl had reference to this influence in the production, not merely of inflammation, but also of all diseases, notwithstanding the objections of Gassendi, urged against the physiology of Des Cartes, that the direct influence of the mind was limited to the brain and the organs of sense and volition.

140. The doctrines of Stahl and Hoffmann continued for many years to divide medical opinion, notwithstanding the efforts of Kaauw Boerhaave in behalf of the views of his more celebrated uncle, and his endeavours to connect them with the system of Hoffmann. In this country the opinions of Hoffmann, according to the explanation and modifications of them attempted by Cullen, became most generally adopted, particularly with reference to inflammatory diseases, although the able writings of Whytt strictly belonged to the school of Stahl. Of all the successors of Boerhaave, Gorter most strenuously insisted upon the fact, that inflammation does not consist of congestion of the diseased part, but of an irritation affecting the vital condition of the vessels; and the circulation in them. The influence of irritants upon the state of vital action was, however, first contended for by Glisson; but to Gorter and Gaubius belongs the credit of having more fully illustrated it, and developed the laws of excitement, thereby furnishing a basis for the doctrines of Brown and Darwin at a much more recent period.

141. Whilst the doctrines of Boerhaave, Stahl, and Hoffmann were dividing medical opinion, and at a time when the views of Hoffmann were gaining the ascendancy in their more general adoption, Haller first published his opinions on *irritability*. He afterwards developed them more fully, and referred this property to the organisation of the muscular fibre, but was opposed by Whytt, Lorry, and Gaubius, as to its precise source; and, contrary to the opinion of the former, who referred irritability to cerebro-spinal nervous influence, he carefully distinguished it from, and endeavoured to prove its independence of, this influence. He disputed the doctrine of this pathologist, that exaltation of irritability determines the circulating fluids to inflamed parts; yet there is no doubt, as Whytt observes, that the "heat, redness, and inflammation, brought on the skin by blisters and sinapisms, are not owing to any increase of the force of the heart, or of the *momentum* of the blood in the larger vessels, — though this is often an effect of their application,—but merely to the action of these irritating substances on the cutaneous vessels, whereby the motion of the fluids in them is greatly augmented." Haller believed that the accumulation of blood in the capillaries was owing chiefly to constriction of the small veins, and that the derivation of this fluid to any particular part should be attributed to the removal of the resistance furnished by the state of the capillaries and veins. He agreed with Whytt, that obstruction cannot of itself produce inflammation; and insisted upon extravasation of the red particles, as constituting a part of the redness observed in some inflamed tissues. Winter, nearly at the same time as Haller, published views as to irritability, similar to those of this celebrated pathologist; and Verschuir greatly extended, and at the same time modified, the doctrines of the latter, especially as to irritability of the arteries and capillaries in warm and cold-blooded animals. The

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* Perrault commenced his magnificent career as a physician, and soon acquired by his writings the first eminence as a physiologist, naturalist, painter, sculptor, mechanist, and architect; in which last character he is best known, especially as the architect of the beautiful façade of the Louvre. He translated and illustrated Vitruvius with splendid drawings and engravings; wrote an extensive work, in two folio volumes, on the Natural History of Animals; published numerous Essays on Physiology and Physics; and at his death left for publication a collection of recently invented and useful machines. All his writings abound in originality; for, in his very diversified studies, he was guided chiefly by observation and his own genius.

chief sources of error in the observations of those eminent writers are their having viewed the fibrous coat of the arteries as muscular; their imputing the properties of muscular tissues, not only to these vessels, but also to the capillaries, which are unprovided with this coat; and their confounding not only organic or insensible contractility and vital expansion, but also the elasticity of fibrous tissues, with the irritability or sensible contractility of muscular fibres. The intimate structure of parts, and the kind and degree of vital manifestation proper to each, were imperfectly known to them, and indeed to many of their successors, and were insufficiently distinguished one from another; and hence were confounded in such a manner as to vitiate most of their pathological inferences.

142. The chief modification in the theory of Hoffmann, suggested by Cullen, was his belief in a *phlogistic diathesis*, predisposing to, and occasioned by, local inflammation, — this diathesis consisting in an increased contractility of the fibres of the whole arterial system. He objected to the opinion of Boerhaave, as to congestion of the vessels being a part of the inflammatory state; and contended that the obstruction is owing to spasm, which indirectly causes an increased afflux of blood to the affected part. "A spasm," he remarks, "of the extreme arteries, supporting an increased action in the course of them, may therefore be considered as the proximate cause of inflammation, at least in all cases not arising from direct stimuli applied; and even in this case, the stimuli may be supposed to produce a spasm of the extreme vessels."

143. Some pathologists, towards the close of the last century, and in still more recent times, being unable to reconcile the idea of increased action with the enlargement of the capillaries, and the swelling constituting inflammation, believing, as they did, that increased action must necessarily be productive of contraction, had recourse to the supposition that the disease depended upon *relaxation and diminished action of the extreme vessels;* others, again, ascribed inflammation to *increased action of these vessels;* and thus pathologists were divided into two opposing parties. The chief fallacies, common to both, were, their having taken it for granted that capillary and arterial vessels possess a muscular structure performing the function of muscular parts; and that an increased action, according to the one party, and a diminished action, according to the other, constitutes the principal, and indeed the only, morbid condition throughout the disease. These opposite doctrines have been so warmly discussed in recent times, each party endeavouring to support their own views by experiments, that it becomes necessary to consider them somewhat in detail.

144. *B.* The *doctrine of relaxation*, or diminished action of the capillaries in inflammation, the blood becoming nearly stagnant in the dilated vessels, originated with Vacca Berlinghieri (*De Inflam. Morbosæ Naturâ, Causis, Effectibus, &c.* Flor. 1765.), and was promulgated in this country by Mr. Allen, who modified the opinion of Vacca, and contended that the action of the arteries is increased, a larger quantity of blood being thereby propelled into the weakened capillaries than they can transmit. According to this theory, the exciting causes, even when they stimulate the part, produce not an increased action of the capillaries, but only excite the larger arteries supplying the inflamed structures, and ultimately quicken the contractions of the heart. The effect of this is, that a larger quantity of blood than usual is propelled into the weakened capillaries, and especially the colourless branches; and upon this unusual quantity the weakened vessels are unable to react, so as to carry on the circulation — stagnation and obstruction in them being the result. Dr. Wilson Philip modified the doctrine of Vacca in a different manner; and, whilst he maintained that the extreme vessels are primarily weakened, he contended that the action of the larger arteries supplying these vessels is consecutively increased; the differences between active and passive inflammations depending, according to him, upon the degree in which the arteries supplying the blood to the inflamed part are excited. In further illustration of his views, by experiments and microscopic observation, Dr. Philip remarks, that "the motion of the blood is retarded in the capillaries, in consequence of the debility induced in them: an unusual obstacle is thus opposed to its motion in the arteries preceding them in the course of the circulation, which are thus excited to increased action." In this statement of his views, one difficulty presents itself: — How comes the debility of the capillaries, causing retardation of the motion of the blood through them, to follow directly upon the application of stimuli? Dr. Philip infers the debility from the apparent retardation of the circulation of the red globules in his microscopic experiments; and, having inferred the debility, concludes that the apparent stagnation must really exist. Thus reasoning in a circle, he states the above doctrine as its result. The difficulty here adverted to, seems not to have escaped Dr. Hastings, who appeared in support of the opinions of Dr. W. Philip. The experiments of Dr. J. Thomson, stated in his excellent work on Inflammation, had demonstrated certain points subversive of the doctrine of Dr. Philip, and of these Dr. Hastings took some notice. Inferring, with his master, or, more correctly, with Vacca Berlinghieri, that "inflammation consists of a weakened action of the capillaries, by which the equilibrium between the larger and smaller vessels is destroyed, and the latter become distended," he, nevertheless, is compelled to admit, that increased action or temporary excitement of the capillaries may precede the debility constituting inflammation. "Certain stimuli," he remarks, "applied to living parts, produce an increased velocity of the blood's motion, and a contraction of the vessels. During this state of excitement, the part affected is so far from having any thing like the appearance of inflammation, that the size of the vessels is diminished, and the part paler. But if the stimulus be long continued or increased in power, the small vessels, which, in the natural state, admit only of one series of globules, become so dilated as to allow an accumulation of a much less fluid and redder blood in them, which loses its globular appearance, and moves much more slowly than that which previously passed through the vessels. The part now appears inflamed. If the stimulus be removed, the blood-vessels do not soon regain their original state; time is necessary to allow them to recover their contractile power, so as to prevent the impetus with which the blood is propelled by the heart and larger arteries from keep-

ing up the dilated state of the capillaries." Dr. HASTINGS further contends, that, when acrid substances produce inflammation, debility of the capillaries takes place without previous excitement, the blood becoming very red, circulating very slowly, and stagnating in some of the branches. As Mr. MORGAN remarks, the hypothesis of weakened action of the capillaries, and slower motion of the blood in them, has been the most generally adopted of the recent theories of inflammation, because it admits of a more easy demonstration with the microscope.

145. All the supporters of this doctrine err, in attributing little or no share in the inflammatory act to direct excitement of the capillaries,—in believing that excitement must necessarily be attended by constriction of these vessels, and that dilatation of them is incompatible with increased vital action,—and in dismissing from their consideration the other morbid acts contributing to the production of the disease in its various stages and forms. That the extreme capillaries are weakened, dilated, and congested, and even that the blood stagnates in them at a more or less advanced period of sthenic inflammations, and at a very early period of the asthenic forms, have been stated above; but this condition is only one of several constituting the disease, which, in no instance and in no stage, depends upon a singleness of event, as contended for by the espousers of this and the opposite theory.

146. *C*. The *doctrine of increased action* of the vessels in an inflamed part may be attributed, as stated above (§ 140.), to GORTER and GAUBIUS, if not to GLISSON. They considered that inflammation was the consequence of *irritation*, which increases the vital action of the vessels, and propels the coloured blood into the colourless capillaries. Mr. J. HUNTER believed that inflammation is an increased action of the vessels of a part, attended by accelerated circulation; but he erred in supposing the vessels to be muscular, and the error vitiates more or less all his reasoning on the nature of the disease. Mr. MORGAN states that Mr. HUNTER's "opinion of the nature of inflammatory action is not clearly stated, nor does it appear from his writings that he had ever made any experiments in order to ascertain the state of the minute vessels." Mr. HUNTER, however, has stated his opinion of the nature of inflammation in several places, even in the same chapter, and to the purport just given. At another place he observes, "the very first act of the vessels, where the stimulus which excites inflammation is applied, is, I believe, exactly similar to a blush. It is simply an increase or distension beyond their natural size;"—and again, "whatever purpose the increase of the size of the vessels may answer, we must suppose that it allows a greater quantity of blood to pass through the inflamed part than in the natural state, which supposition is supported by many other observations." Indeed, the whole of the section, on the "*Action of the Vessels in Inflammation*," contains a very detailed and distinct account of his views as to the nature of the disease. As to the assertion, that Mr. HUNTER never made experiments to determine the nature of inflammation, the reader has only to refer to the section just mentioned, where he will find the details of observations and experiments made upon warm-blooded animals—not frogs, and other animals unsuited to the satisfactory elucidation of the subject—proving the justness of his views as respects certain states and stages of the disease.

147. The increased action of the capillaries in inflammation has been advocated by Dr. PARRY, partly by Dr. J. THOMSON, and by Mr. JAMES. Yet most of the same fallacies which vitiate the doctrine of the opposite party, may be urged against the majority of those who contend for the truth of this, and especially their belief in the irritability of these vessels. Indeed, this phrase has been employed by many, without attaching any precise meaning to it, and without being aware that, if by *increased action* they meant *increased contraction*, or even an increased power of alternate relaxation and contraction, as in muscular tissues, the circulation of the inflamed part would be altered by it very differently from what is actually observed. The circulation in health through the capillary vessels does not require the aid of any action on their part; for the contractions and dilatations of the heart, and the elasticity of the larger arteries, are quite sufficient for the transmission of the blood; not only in the capillaries, but also in the veins. Agents which change the tonicity of the tissues will necessarily affect that of the extreme vessels, and, consequently, the state of circulation through them; but such agents will seldom give rise to inflammation, unless by a succession of changes, of which alteration of the state of circulation,—whether increased or diminished,—is only a part, as I shall endeavour to show hereafter.

148. The experiments which have been planned and performed with a view of establishing the truth of either of these doctrines of inflammation, have been altogether vitiated by the circumstance of the chemical action—1st, upon the tissues,—2dly, upon the capillaries,—and 3dly, upon the blood, of the agents employed in these experiments, having been entirely overlooked. But this is not all; the physiological or vital action of these agents has been neglected, equally with the chemical action, and even with the changes they produce upon dead animal matter. These experiments abound, moreover, in other sources of fallacy, attributable to the means and aids used in ascertaining the effects, and to the subjects upon which they have been performed. Can it be believed that all these circumstances,—any one of which is sufficient to overturn the conclusions drawn from these experiments,—have been neglected? Instead of observing closely the changes taking place in tissues actually inflamed, and the succession of these changes in the different stages and forms of inflammation, as affecting different structures, substances producing both vital and chemical alterations in the tissues, blood-vessels, and blood itself, have been applied to parts, and the effects directly and remotely produced by them have been described as identical with inflammation, and made the basis of the prevailing doctrines of the disease. Before any inference, or even the smallest fraction of information, can be derived from the experiments paraded by many of the writers on this branch of pathology, it is necessary to bear in mind that acids, or alkalies, or alcohol, or turpentine, or neutral salts, when applied to a vascular tissue, produce effects which are not identical with any of the usual forms of inflammation. Acids affect the nervous influence of the part; constringe, corrugate, or cornufy the tissues and capil-

laries; change the colour and state of the blood in the extreme vessels, and arrest the circulation in them; and if inflammatory appearances supervene, much of the primary changes will still continue to modify its characters. Alkalies produce opposite effects; — they weaken the vital cohesion of the tissues, partially dissolve them and combine with them, redden and otherwise affect the blood, and, according to their strength, influence the form and termination of the morbid changes they produce in the part. Turpentine, and, in a less degree, alcohol, in their primary action, change the state of nervous power, constringe the capillaries and tissues, and retard the circulation in them; and neutral salts variously affect the vitality, the structure, the circulation, and the blood of a part, according to their individual constitution. When any one of the numerous substances which may produce inflammation is applied to a living tissue, the effects are not limited to the spot with which it is in actual contact. The impression extends, and a modified, or even opposite, action may be superinduced in surrounding parts. If the substance be injurious, or subversive of vital power in the part, more or less resistance is offered to the extension of the mischief. The injury affects the state of organic nervous power; and the irritation, or consequent reaction of this power, and its influence upon the surrounding vessels and blood, give rise to inflammatory action, either in the seat of injury or around it. If a living membranous tissue be pricked with a red-hot needle, the following effects will result; but these effects, although inflammatory in many respects, are not to be viewed as identical with idiopathic inflammation, as they have been by some writers, and for the reasons which will be stated. The red-hot needle will produce much pain, attended by the immediate constriction or corrugation of the tissues and capillaries; the blood being driven from the part immediately surrounding the puncture, the red globules undergoing a change in colour, and becoming stagnant in, and adhering to, the vessels adjoining the punctured spot. This is the immediate effect; but in a short time, — varying, however, with circumstances, — the punctured spot either becomes dark or black at a central point, around which the vessels dilate, the injury having either destroyed their continuity or obstructed them. The increased vascularity, which soon takes place around the injured spot, now becomes inflammatory, and is partly owing to obstruction in this spot, and to the consequent development of the surrounding capillaries, so as to carry on the circulation. But the affection, by the injury, of the organic nervous influence of the part, so influences the state of the extreme vessels, as to produce the chief of the phenomena. Now the early part of the changes here observed, are not to be viewed as identical with idiopathic inflammation, although illustrative of the production of inflammatory action by certain injuries; for the agent employed cornufies the capillaries, stagnates and changes the blood in them, obstructs their circulation, and severely affects the nervous influence; this last change especially producing, in the extreme vessels of the injured part, consecutive effects, which only are truly inflammatory, particularly in previously healthy constitutions or structures.

149. In order to arrive at any thing like a just notion of the nature of inflammation, the phenomena constituting it should be closely examined from the commencement, whether arising spontaneously, or produced by an irritant or excitant. But the phenomena observed in a single tissue, or in a particular form of the disease, are not to be viewed as constituting alone its characters in all stages, forms, and circumstances. The essential characters, as well as the subordinate phenomena, of inflammation, vary in all the states and stages of it; they are continually changing with their duration and the nature of the causes which produced them, and according to the temperament, habit of body, diathesis, and constitutional powers of the patient. So diversified do they thus become, that it would be endless, if not impossible, to describe them in all their conditions, periods, and consequences. The most prominent pathological states can only be mentioned; the descriptions already given, and the observation or experience of the reader, will supply deficiencies which must still remain, even after the most minute details.

150. ii. Pathology of Inflammation. — *A. Of the Nature of the Sthenic Forms.* — *a. The organic nervous tissue is primarily affected in the seat of inflammations of all kinds.* — I have already contended that inflammation, in its more *sthenic forms*, is a result of a *morbidly* excited state of the organic nervous tissue surrounding the extreme vessels or capillaries of the affected part, or a derangement from an unnaturally exalted condition of these nerves, on which the function of these vessels, and indeed of the whole vascular system, have been shown to depend. One of the chief inquiries concerning the nature* and pathological relations of inflammation is, whether this excited or exalted state of the organic nervous tissue is one of simple excitement or not, — whether the functions of the nervous tissue be merely increased above the healthy pitch, — or whether or not they are also otherwise changed. I have stated them to be morbidly or unnaturally excited, thereby indicating that they are increased differently from what we observe in a healthy part from the application of a stimulus, as respects both the *duration* and the *kind* of action they occasion.

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* The views which I now proceed to state, were published by me first, as already noticed, in 1815; on several occasions during the years 1821 and 1822, in the *Medical and Physical Journal*, and in the *London Medical Repository*; and still more fully in my *Appendix* to M. Richerand's *Elements of Physiology*, published in 1824. They were the result of a close investigation of the subject; and if the reader will refer to the section on *Inflammation*, which I added to the last of the works just mentioned, and afterwards to that of Kaltenbrunner, published in 1826, he will find my doctrine and observations fully confirmed by his researches, as well as by those of M. Gendrin, also published in 1826. A very large reprint of my *Appendix*, containing the same section on *Inflammation*, without any alteration or addition, appeared in 1829. In 1835, and at still later periods, treatises and essays on Inflammation have been published by several writers, in which the principal parts of my doctrine have been adopted, but without any reference to the original propounder of them. Of this I thought it not worth while to take any notice at the time, as I was about having it in my power to do myself full justice, and to an extent, in respect of circulation, infinitely beyond what could be reached by the works in question. It is very probable that the opinions first brought forward by me have been subsequently suggested to these writers, without having ever perused any of my writings on the subject; yet one of the works only, and that one containing a full exposition of my doctrine, has been circulated to the extent of several thousands.

151. The *duration* of the healthy exalted action consequent upon simple excitement, mental or physical, is generally brief — the effects soon subsiding with the removal of the cause — because the nervous influence exerted on the capillaries is simply increased, without the mode or habitude of this influence being changed in kind. When, however, an irritant, stimulus, or other cause, operates upon a part so as to change the mode of organic nervous influence endowing it and its capillaries, the consequent vascular excitement or action is not only of longer duration, but is also altered in kind: it becomes truly morbid; and it either subsides gradually before the conservative powers of this influence as exerted throughout the frame, or undergoes a succession of changes, until it terminates in one or other of the ways described as usually observed in sthenic inflammations.

152. That the first change occasioned by the exciting cause takes place in the organic nervous influence of the part, is proved by the early effect produced by it upon the organic sensibility, and on the functions more immediately dependent upon this influence. The uneasy sensation of inflammation, in its various states and modes, is to be ascribed (§ 8.) to the morbid impression made on the organic or ganglial nervous tissue, and is to be viewed as the sensible expression of the consequent change in the condition of the influence exerted by this tissue in the affected part, — as indicating a morbid state of this portion of the nervous system, producing, and attended by, deranged action of the capillaries in the affected organ, and often exciting, or otherwise disturbing, the sensibility and functions of the cerebro-spinal nerves, with the terminations of which the former becomes associated in many of the textures. The pain or uneasy sensation attending the changes in the organic nervous tissue, which affect the state of the capillary circulation, so as to give rise to inflammation, is, as shown above (§ 82.), very distinct from the morbid sensibility often manifested by the cerebro-spinal ramifications, as in the different forms of neuralgia, and of spasmodic affection; and, although the latter is much more acute and violent than the former, yet it never gives rise to much vascular disorder. Excitement of the cerebro-spinal nerves has but little immediate influence upon the capillary circulation, excepting that of the countenance, as in the act of blushing; and then this is only temporary. Whatever influence these nerves may possess over the circulation, is only produced through the medium of the organic or ganglial nervous tissue distributed to the capillaries and structures generally. This provision is important as respects the preservation of the healthy functions of parts; for if the vascular system were *directly* under the dominion of the cerebro-spinal nervous system, all the functions of circulation, secretion, nutrition, &c., which are subjected to the organic nervous influence, would be liable to continual derangement from the various impulses of the will and the passions. — From this it will appear manifest, that changes in the cerebro-spinal nerves of an organ, or part, can have but little effect in the production of inflammation, whilst alterations of the organic nervous influence or sensibility are almost, if not altogether, necessary to its existence. In cases of severe injury to the spinal chord causing paraplegia, the lower extremities are not more liable to inflammation than in health.

153. *b. The causes being of an exciting nature, the primary effect on the organic nervous influence, and on the capillary circulation, will partly or chiefly consist of excitement, — the sthenic states of inflammation generally resulting.* — Whenever the causes of inflammation, either directly or indirectly, are of an exciting kind, — whenever excitement is even one only of the effects produced by them, — we must admit that the vital influence of the organic nervous tissue of the part upon which these causes act, will be increased for a time by them; the excitement being, however, modified by their nature. The organic nervous tissue, supplying the capillary vessels of the affected organ, will especially manifest this effect in the altered action of these vessels. Whenever the organic nervous influence is locally increased, the vital actions of the associated capillary vessels are also augmented — the diameter of these vessels becoming enlarged, and a larger column of blood circulating in them with increased velocity. This is evinced during excitation of secreting surfaces and of erectile parts, and by the enlargement of the nerves and blood-vessels of the uterus after impregnation. That the principal part of the more direct effects produced by the application of stimulants to living structures consists of exaltation or excitement of the organic nervous tissue, causing increased action of the vessels, is proved also by the phenomena observed to follow such applications to organs or parts supplied either chiefly or only by organic or ganglial nerves. Now, if we admit, what cannot be disproved, that excitement of the organic nervous influence of a part increases the vascular activity and circulation of that part, it must necessarily follow that, whenever an increase in degree forms a part of the change induced in this influence by the causes of inflammation, a proportionate augmentation of the size of the capillaries will take place — an active expansion, or turgescence, of the extreme vessels will result, and give rise to states of inflammation of a more or less sthenic character, according to concomitant circumstances, either extrinsic or intrinsic, in respect of the peson affected. But that the causes of sthenic inflammations do not merely excite the susceptible nervous tissue, and consequently vascular action, but also otherwise change the former, and consecutively the latter, is proved by the duration of the resulting effects, and by the succession of alterations, both local and general, as above described.

154. *c. In sthenic inflammations, organic nervous influence, and vascular action, are not only primarily increased, but also otherwise changed.* — In the early stage of all inflammations, there is every reason to suppose that the organic nervous influence of the capillaries and inflamed part is not merely changed in degree, but that it is also modified in kind; and that the differences existing, not only in the forms and varieties, but also in the stages, of inflammation, depend upon the extent and combination of these changes, — an excited, and at the same time a modified, kind of influence especially characterising the sthenic forms of this disease; the combination of impaired and altered influence with excited action constituting the more active states of the asthenic varieties. The irritant or other cause of inflammation

seems to impress the organic or vital influence, or the ganglial nervous tissue, of the part, or of the system more generally, in such a manner as to prevent this influence, and the vascular disorder produced by it, from returning to the natural state, at least for a considerable time. Morbidly excited action is thus induced in the capillaries of a part, particularly in the sthenic forms of the disease, and is succeeded by other changes. When the exciting cause alters the organic nervous influence in other modes, the capillaries are co-ordinately affected. If this influence is depressed as well as otherwise altered, locally or generally, either by the operation of the cause, or by pre-existing disorder, a state of action characterised by deficient power is the result. The specific forms which inflammation assumes when arising from certain causes, particularly from infection or inoculation, depends upon the mode or nature of the morbid impression made upon the organic nervous tissue of the part, especially that distributed upon, or interwoven with, the capillaries. The causes may act by their continued presence; thus irritating bodies, or the lesions of structure produced by chemical agents or by injury, may prove sources of irritation to the nerves and capillaries of a part; but more frequently the exciting causes change, by the impression made at first by them, the degree, mode, or state of influence exerted by the organic nervous tissue upon the capillaries and smaller vessels, and upon the fluid circulating in them; the resulting morbid action presenting corresponding and peculiar characters in respect of kind, degree, and power or tone. This is more remarkable in the more specific forms of inflammation, either produced by certain poisonous agents, or attending some constitutional maladies.

155. In experiments upon living tissues, the effects produced by various stimulants and astringents have in some respects been misinterpreted by the experimenters; and the slight constriction of the capillaries that directly follows the application of such substances, and before the dilatation which subsequently occurs, has been viewed as the first part of the inflammatory act. But this effect depends upon the action of these substances, particularly of turpentine, alcohol, the salts, and many others, upon the vital contractility of the tissues and extreme vessels. The instant effect of these is more or less constriction of the capillaries; but this very soon ceases, the natural state, or expansion beyond it, soon following. When the substance employed is of an irritating nature, without any astringent property, an enlargement of the capillaries is the next phenomenon to follow the impression made by it upon the organic nervous tissues; this impression being frequently rendered instantly and acutely sensible. In observations or experiments made upon the living tissues, care should be taken to distinguish between the effects produced, — 1st, upon the organic sensibility; — 2d, upon the organic contractility; — and, 3d, upon the physical properties of the tissues — upon their cohesion, elasticity, &c., or upon the properties which animal substances continue to manifest some time after death. The *first* of these ceases instantly with dissolution; — the *second* remains for a short time afterwards, but is soon exhausted by strong stimuli; — and the *third* continue much longer, but gradually disappear with the supervention of decomposition, yet admit of being more or less preserved and somewhat modified by various substances of an astringent and antiseptic nature. In the investigation of the nature of the changes in living structures, usually called inflammatory, the intimate relation existing between these changes, and the causes which induced them, should not be overlooked. The mode of operation of the causes, especially with reference to the vital and physical properties just enumerated, and to the local and general circulation, ought to be strictly regarded; and the manner in which the results may be modified by constitutional predisposition should be taken into account.

156. *d. The state of circulation in the early stages of sthenic inflammations.* — The primary affection of the organic nervous tissue having been shown to be one of *morbid excitement in the sthenic forms of inflammation*, and the effects of this excitement to be *turgescence, enlargement, or active expansion of the capillaries*, it next remains to inquire as to *the state of the circulation in the enlarged vessels*. This topic has been much discussed, for observations of the current of blood in the capillaries are liable to error; and besides, the flow of blood may be retarded at a single point, and greatly accelerated at others, particularly when inflammation is produced by mechanical or chemical agents. The state of circulation also undergoes a succession of changes, as will be hereafter shown, with the progress of the disease. It will not be denied that the organic or ganglial nervous tissue exerts a manifest influence, not only upon the capillary circulation, but also upon the blood itself; and that the secreting and other organic functions are under the dominion of this part of the nervous system. It consequently follows, that excitement, depression, or other affections of this influence, will produce co-ordinate changes, not only in the capillaries and related vessels of a part, but also in the state of circulation and in the blood in them. During excitement of the organic nervous functions of an organ, the vessels experience not only an expansion, but also an increase of tone — a vital turgescence. The capillaries, although increased in diameter, still retain the power of reacting insensibly upon the blood propelled into them, so as to preserve, if not to accelerate, the rapidity of the currents passing through them. The necessary result of these states is an increased flow of blood, and a rise of temperature, and these effects continue until the excitement is exhausted, — varying, however, in feature as well as in continuance, and more especially in the associated phenomena and consequences, with the mode or kind of excitement directly resulting from its cause.

157. When the propelling power of the heart and the tonicity of the larger arteries give rise to an increased *vis à tergo*, and particularly when the expansion of the extreme vessels is such as to allow a portion of their contents to escape through the delicate or imperfect canals in which they terminate, or when an obstacle is opposed to the return of the blood through the veins, a portion of the red particles escapes with the serum into the inflamed tissue, generally at minute or distinct points. This is observed especially when the tone of the capillaries in an inflamed part is exhausted, either by the nature of the exciting cause, or by

the previous excessive excitement, before the increased action of the heart has subsided.

158. *e. Of the development of new vessels in inflamed parts.* — It is not only the vital turgescence or expansion of the capillaries, so that those which could not admit the coloured globules of the blood in the healthy state readily admit them in an inflamed part, but also the developement of new vessels that is often observed. But this latter event takes place chiefly in serous membranes, and especially in albuminous exudations from the inflamed surface. It possibly may also occur in other parts, to a more limited extent, although it does not admit of so obvious a demonstration as in these. It can only occur in the various grades of sthenic inflammation, and it fully evinces that, although truly morbid in its nature, this form of the disease is characterised by vital activity, and by a deranged increase of the formative process in the affected part. In asthenic inflammations, however much capillary canals may be enlarged so as to admit a greater column of blood, no new vessels are developed, unless the asthenic be converted into the sthenic state. In the former state of disease, the expansion is the result of impaired vital tone and resistance, both of the capillaries and of the tissues affected; and the organic nervous power of the part, and the action of the capillaries upon their contents, are incapable of forming either coagulable lymph or new vessels. In the latter state, nervous power and vascular action are capable of producing the one, and often also the other.

159. When sthenic inflammation affects serous membranes, the morbid exudation thereby formed on their surfaces is sufficiently consistent to admit of the extension or growth of new vessels from those which had become enlarged in the early stages of the inflammatory act, and to give them support until they acquire considerable development. But when the asthenic disease implicates these membranes, the secretion from their surfaces is too watery or serous to furnish consistent canals or channels in which the contents of the capillaries may be conveyed beyond those which are morbidly enlarged, without commingling with the rest of the effused matter. In cases where new vessels form, the exuded lymph or albumen, into which they run, is not only to a certain extent consistent, but also somewhat scanty, or at least not very abundant; but in cases where they cannot be formed, the fluid effused is generally both serous and copious.

160. The production of new vessels in parts sthenically inflamed, particularly in exudations of lymph, is observed chiefly in young persons, and especially in these who are in the course of development. Occasionally the new vessels are numerous and distinct, even before the lymph had become at all abundant or consistent. In some very beautiful injected preparations by Mr. KIERNAN, the eminent pathologist, that he kindly showed me, this was most remarkably demonstrated; as well as the fact, which has been controverted by some French pathologists, that the new vessels shoot out from the inflamed surface, if not from those enlarged in the early stage of the inflammatory act. When new vessels form in the fibrinous lymph exuded from serous membranes, they may often be injected,—the continuity of these vessels with those of the affected part being thereby clearly shown. Yet the most vascular part of the newly organised false membrane may not be that nearest the seat of inflammation,—the new vessels forming several anastomoses, and occasionally becoming enlarged in some places at a distance from the surface whence they were produced.

161. *f. Consecutive changes in the sthenic forms.* — The successive changes taking place in the course of sthenic inflammations are conformable with the laws of the animal economy. The excitement produced in the organic nervous tissue and capillaries of the part is exhausted with a rapidity, and to an extent, in proportion to its intensity relatively to the powers of the constitution, and of the part affected; and as the exhaustion proceeds, the tonicity of the extreme vessels and of the diseased tissue, as well as the vital cohesion of both, is weakened, the circulation through them retarded, and the colour of the blood deepened. The extent to which these changes take place, in connection with the degree of general vascular action, and of constitutional power, fully accounts for the lesions consequent upon sthenic inflammations. When phlegmasia arises from specific causes, the kind of morbid excitement primarily induced by them will, according to their nature, more or less modify these changes, and give rise to certain results in preference to others. We perceive this in the exanthemata and in various inflammatory diseases. The tissue affected will also modify the continuance and mode, as well as the consequences, of the morbid excitement. But there can be no doubt that the successive alterations in the inflamed structures are merely consequences of the morbid impressions made by the exciting causes upon the organic nervous tissue, particularly in its connection with the capillaries; the states of these and the connected vessels, of the circulation through them, of the blood, and of the diseased part, being the effects which may either disappear before the vital resistance of the frame, or terminate in any of the ways described above (§ 39, *et seq.*).

162. *B. Of the Nature of the Asthenic States.* — The remarks which I have just offered more especially refer to the *nature of the more sthenic inflammations*, and it is, therefore, necessary to consider *the circumstances in which the asthenic states differ from these.* It has been shown that these states proceed chiefly from constitutional predisposition, or from previous or associated disorder, or from the nature of the exciting cause. In either case, the organic nervous influence, and, consequently, the tone or vital contractility of the tissues and capillaries in the seat of the disease, are quickly exhausted or readily depressed, and soon become otherwise morbidly affected,—effusion, softening, disorganisation, or gangrene, taking place with a rapidity in proportion to the primary vital depression, or to consequent exhaustion, and to the nature of the impression made by the exciting cause. In cases of asthenic inflammation, either there has been originally, or acquired, great debility or deficiency of the organic nervous power, or the assimilating and excreting functions have been long disordered and imperfectly performed, or the exciting cause has been of a powerfully depressing or poisonous nature. Indeed, two, or even all, of these circumstances may be concerned, each more or less, in the production of some one or other of the morbid states of action comprised under the

more generic appellation, asthenic inflammation. Owing to one or more of these circumstances, the vital contractility of the capillaries and tissues of the affected part is impaired; vital cohesion is weakened, so as to occasion remarkable softening and friability of the structures; the tone of the extreme vessels is so far lessened as to admit the effusion, and percolation through the more yielding tissues, of the more serous portions of their contents, sometimes coloured by red particles; the vital resistance of the capillaries, owing to the loss of tone, is insufficient either to resist even the weakened impetus of the blood, or to react upon it so as to carry on the circulation through them and the venous capillaries; and, ultimately, increased effusion, retardation or stagnation of the blood in the minute vessels, and all the consequences shown to result from the asthenic forms of inflammation (§ 70, *et seq.*), take place. Throughout the course of asthenic inflammations, the states of organic nervous influence, of vital action in the extreme vessels, and of the circulation in the affected part, are incompatible with the production of coagulable lymph; and hence the effused fluid infiltrates the more soft surrounding tissues, and, owing to its morbid condition, caused by the states of vital action and of the blood, contaminates them, or promotes their disorganisation.

163. The *distension* of the capillaries in asthenic inflammations is referable to impaired or lost tone, rather than to an active vital expansion or turgescence similar to that which characterises the early stages of sthenic inflammations; or, if the latter state exist at first, as it probably does for a very short time, in the less asthenic cases, it soon exhausts itself, and passes into atonic distension, with retarded circulation. But there is every reason to infer, that the current of the blood is impeded or retarded in the capillaries at an early stage, or even from the commencement, of many cases of asthenic inflammation, particularly those caused by septic agents or animal poisons; and that the blood soon becomes stagnant in them, the various consequences, already noticed, appearing according to the intensity and rapidity of the previous changes upon which this has been shown to depend. In proportion, generally, as the circulation is retarded in the extreme vessels, the temperature of the inflamed part sinks, and the colour becomes deep or livid, until a purplish or brown hue is acquired. As soon as these changes take place, disorganisation soon follows, and proceeds with a rapidity in proportion to the weakness of vital power and resistance. If the organic nervous energy be aroused or reinforced by appropriate constitutional and local means, the mischief may be arrested, unless it have already proceeded beyond the powers of restoration, and it may be ultimately remedied, as in the advanced stages of sthenic inflammations. When the asthenic forms are arrested at an advanced stage, they generally assume more or less of the characters of the sthenic condition, reparation taking place as in that form of the disease.

164. *C. Of the Intermediate States of Vascular Action and Vital Power in Inflamed Parts.*— As shown in the article DISEASE (§ 87, *et seq.*), the states of organic nervous influence and vascular action do not always present specific grades or forms, which certain terms can precisely represent. The terms applied to morbid action are entirely relative; and whilst we use the appellations *sthenic* and *asthenic*, to convey an idea of the more extreme and opposite states of nervous power, and of vascular action, we must not overlook that every intermediate form and grade may exist between them. To describe states, so diversified as these are, is obviously impossible. All that can be attempted is to notice certain circumstances generally appertaining to them. — The organic nervous power, evinced by certain inflammations, may not materially vary in *kind* from the natural standard or condition, and yet vascular action may be excessive and very acute, or much more moderate, and, consequently, more protracted, or slight, and more or less chronic. The forms of inflammation, particularly as respects the acute, chronic, and intermediate or sub-acute states, result chiefly from the grades of organic nervous excitement and vascular action; whilst the more specific characters which they present depend principally upon the conditions of the organic nervous energy, as regards not only the *amount* of the excitement or depression, but especially the alterations or *deflections in kind* from the natural habitudes of this energy. Whilst the *activity* of the inflammation depends chiefly upon the grade of vascular action in the inflamed part, in connection with the degree of general vascular commotion, the *specific character* of inflammation arises principally from the truly diseased impression made upon the organic nervous tissue of the part, and from the change thereby effected in the influence of this tissue on the vascular system, such change being in the kind, rather than in the degree, of organic nervous influence.

165. The varieties of ERYSIPELAS, the local inflammations attending the different *exanthemata*, and, indeed, the numerous specific forms of inflammatory action induced by these and other infections or animal poisons, are illustrations of alterations in the *kind* or *mode*, rather than in the *degree*, of local and general organic nervous energy and vascular action. In these, and in all the asthenic states of inflammation, there is a much more remarkable alteration in kind from the natural standard than in the sthenic forms. The *intermediate states* between the most fully expressed sthenic and asthenic conditions depend chiefly upon specific or other deviations in kind — *upon the truly morbid changes* now contended for, especially such as immediately proceed from the nature of the exciting causes, or from contagion. The principal of these, owing to their specific form, are fully discussed under appropriate heads.

166. *D. Of the Existence of different States of Capillary Tone and Circulation in the same Inflamed Part and the Vicinity.* — Much of the discussion which has taken place as to the capillary circulation in inflamed parts has been owing to the variations in this state during the course of the disease, and to the different vital conditions of the capillaries and of the small arteries, in different parts, or in the several tissues comprised in the seat of inflammation. — When compound or parenchymatous structures are inflamed, such differences or variations are the most remarkable, particularly if the disease has commenced at a single point. At this point, especially, the tone of the capillaries becomes the soonest exhausted, and the current of the blood retarded; and these states increase the vital turgescence of the surrounding

vessels, and accelerate the circulation through them. When the substance of an organ is inflamed, the fibrinous lymph exuded at the point first affected, often retards, by its pressure, the circulation in the vessels at this point; and owing to this obstruction, the surrounding vessels are the more readily developed, and more prone to become morbidly turgescent. The lymph effused also affects the vitality of the part, either occasioning more or less irritation to the organic nervous tissue, or perpetuating or modifying the disorder of this tissue already existing, that caused its effusion. Müller thinks that the lymph coagulates in the extreme capillaries, when the inflammation is seated in the substance of an organ; but I believe that it is exuded in the areolæ of the structure, thereby rendering the part more solid or dense; the change thus produced having been termed condensation, solidification, hepatisation, or splenification, according to the appearances assumed, and to the organ affected. It is only in the sthenic forms of inflammation that the effused fluid gives rise to these changes, as shown above.

167. If the intensity of the morbid action in the spot first affected be so great as to exhaust its organic nervous power or its vitality, and to retard its circulation, or to stagnate the blood in the capillaries, not only do the surrounding vessels become more turgescent and developed, but the blood which has thus stagnated, and the tissue itself, undergo very material changes, as described above (§ 156.). Hence very opposite states of the circulation generally exist in different parts of the seat of inflammation, especially when the disease is advanced. In cases of injury, particularly of laceration, pressure, or other changes, the capillary circulation is often directly obstructed; and either independently of lesion of the organic nervous tissue and sensibility, or aided by such lesion, diseased vascular turgescence is thereby developed around the seat of injury, — the capillaries thus obstructed, and the blood contained in them, soon undergoing changes productive of suppuration, or ulceration, or gangrene, whilst sthenic vascular action is either proceeding in the surrounding turgescent vessels; or passing into exhaustion or into the asthenic condition, progressively from the point of injury, or from the spot first affected, according as the constitutional powers may resist, or may favour, the extension of the mischief.

168. *E. Of the State of the Venous Circulation in Inflamed Parts.* — There is every reason to believe that the venous circulation is locally more than usually active in the sthenic and acute forms of inflammation; but that it is more or less languid in the asthenic varieties. When the former, also, goes on to suppuration, and especially to ulceration, the circulation in the veins, more immediately proceeding from the part, is generally somewhat retarded, the retardation increasing these changes. Hence the importance of favouring the return of blood from the part by position, when these consequences of inflammation have taken place. Whenever the venous circulation is obstructed, effusion and œdema increase rapidly in the part affected, and in its vicinity; and the consequent retardation or stagnation of the blood in the capillaries, induces or accelerates disorganisation. This is observed very frequently in erysipelas, and constantly when the inflammatory action extends to the veins — which not infrequently occurs when the constitutional powers are depressed, or in the more asthenic forms of the disease. In such cases the local lesions are remarkably increased, not only by the stasis of blood in the capillaries, but also by the more copious morbid effusion caused by the obstructed return of blood.

169. *F. Of the Function of Absorption in the Seat of Inflammation.* — In the early stages of sthenic inflammation especially, absorption seems to be less than usually active; but, when the disease proceeds to ulceration, or even to suppuration, and when it assumes asthenic forms, then the absorbent action is often increased, although there are numerous exceptions to this, absorption sometimes being manifestly impaired. When the absorbents become inflamed, owing to the morbid nature of the cause, or of the matter formed in the primary seat of disease, then more or less of obstruction results, and the function is arrested, great tumefaction of the parts beyond the obstruction taking place, and increasing the local mischief by pressure and by the contaminating influence of the morbid secretion. In obstructed venous circulation the swelling increases rapidly, chiefly from augmented effusion; in impeded absorption it advances with nearly equal rapidity, from the fluid being undiminished by removal. In either case the effused fluid undergoes material changes during its retention, and becomes more and more hurtful to the tissues containing it, and more irritating to the vessels which may absorb it.

170. It was supposed by John Hunter and others, that *ulceration* depends upon increased activity of the absorbents of the part, when inflammation has reached a certain period of its progress. But I believe that it is chiefly owing to the superficial softening or loss of the vital cohesion at that part of the inflamed tissue where the extreme vessels have lost their functions, and to the solution of the molecules of the tissues in the fluid effused from the diseased surface (§ 48.). Absorption is probably also concerned in the process, and in various degrees, according to the seat of the inflammation, and the states of organic nervous or constitutional power and of vascular action.

171. *G. Of the States of the Blood in the Capillaries of Inflamed Parts.* — The blood circulating in inflamed parts presents very different appearances with the form and stage of the disease. In the sthenic forms, and particularly in the early stages, before any of the more unfavourable consequences have supervened, the blood is florid, and partakes much of the characters of arterial blood; but in the asthenic forms, and less remarkably in the advanced stages of the sthenic, it is more venous, or of a darker hue. It is sometimes quite purplish, or blackish, particularly when a tendency to sphacelation or gangrene occurs. Also, as it circulates in the capillaries, the globules seem, under the microscope, gradually to move more slowly, and to be attracted by the sides of the vessel, or to stagnate in the capillary canals. This change seems to commence in the smaller or capillary veins, and to extend, especially in the asthenic states of inflammation, in the direction of the minute arteries, the temperature sinking with the deepening of the hue, and with the loss of motion of the blood globules. In other respects the

blood presents the appearances already described with reference to the different forms of inflammation. (See § 25. 66.)

172. iii. Of Reparation of the Consequences of Inflammation. — Reparation of the effects of inflammation is accomplished only under the influence of life, although much assisted by art. It may be very briefly considered, with reference, 1st, to the removal of those changes more immediately resulting from inflammation that are independent of loss of substance; and, 2d, to the restoration of disorganised or of lost parts, where either has taken place. Whether morbid depositions are to be removed, or losses of substance are to be supplied, restoration of the manifestations of life in the various organs to their healthy states is the chief intention to be fulfilled. Frequently nothing more than the subsidence of the morbid action in the affected part is necessary to the reparation of the injury done; but often something more is requisite, and the aids of science are needed to assist in the work of restoration.

173. *a.* The *softening*, or impaired vital cohesion of the inflamed part, the *fluids effused* in the areolæ of the tissue, and the coagulated lymph thrown out upon a serous surface, or poured into the porous structure of an organ, so as to solidify it, will generally be removed, when the morbid action which caused these changes has altogether subsided. With the return of the functions of the part, the vital cohesion will be restored, and the activity of absorption will gradually remove the fluids effused in the substance, or upon the surface, of an organ. If the lymph have become partially organised, or have formed false membranes on serous tissues, or have agglutinated the opposing surfaces of shut cavities, the difficulty of removal will be increased, and the time of effecting it prolonged. But if the inflammatory action be entirely subdued, the object will be ultimately attained, and with a rapidity and certainty in proportion to the restoration of the powers of life throughout the frame. Even when the coagulated albumen is organised into false membranes, or into cellular adhesions, their extent and their vascularity will gradually diminish, and they will either entirely and slowly disappear, or become merely lax bands, or thin films, offering little or no impediment to the functions of the parts which they connect. Yet, where such adhesions form, a disposition to returning inflammation will generally exist, or the morbid action which produced them will continue in a much slighter and chronic state. It is chiefly to these circumstances that most of the unfavourable results consequent upon adhesions are owing. The lymph effused in the areolæ of a parenchymatous viscus, as in hepatisation or splenification of the lungs in pneumonia, is commonly soon removed with the subsidence of the disease, and much more rapidly and certainly than the lymph poured out upon a serous surface. The albuminous exudations sometimes formed on mucous membranes very rarely or never become organised, but are detached and thrown off as the diseased action subsides, by an increased secretion of mucus from the follicles underneath. In the course, however, of their excretion from the canals which those membranes cover, they often occasion remarkable disturbance, severe spasms, or even death by asphyxia, especially when they form on the respiratory surfaces, as in *croup*, *laryngitis*, &c.

174. *b.* When the organic nervous and vital powers continue but little impaired, serous and albuminous fluids effused during inflammation are generally removed upon the subsidence of diseased action, although the rapidity and completeness of removal will depend much upon the nature, consistence, and extent of the effusion, and the states of constitutional energy. If the fluid is truly purulent, and especially if it form an encysted or circumscribed *abscess*, restoration is then generally difficult, and only to be accomplished, particularly when the collection is deep-seated, either by absorption, or by the extension of the abscess to an external or internal surface, as is fully shown in the art. Abscess (§ 30.). When the fluid of an abscess is absorbed, nothing but a firm cicatrix, generally linear, or irregular and circumscribed, is observed in its former seat. But when it finds its way to a surface, and is evacuated, either the patient sinks under the local lesion and discharge, and the constitutional disturbance, or the work of reparation proceeds under the influence of the vital energies. In this latter case, the discharge from the surface of the abscess becomes albuminous, the parietes contract, and the cavity diminishes. Instead of pus, an albumino-puriform fluid is secreted, which gradually becomes more and more albuminous and scanty. The fluid exuded upon the internal surface of the abscess at last passes into the state of coagulable lymph, under the restoring influence of the organic nervous energy; it becomes vascular, and healthy granulations thus form, and fill up the cavity which the contraction of its parietes is incapable of obliterating; and thus the injury and loss of substance are repaired.

175. In the reparation of *ulcerated* parts a similar process takes place. The softening and solution of the molecules of the tissues in the fluid discharged from the ulcerated part are first arrested by restoring organic nervous energy, by local or constitutional means, or by both. Thereby a more healthy secretion takes place, and suppuration is established, and is followed by granulation in the manner just described, the mischief being thus repaired. Ulceration is most prone to occur, and to proceed rapidly, in parts exposed directly or indirectly to the air, or to the contact of irritating matters; and in those which are most distant from the centre of the circulation, and in which the capillary circulation is naturally weak or slow. Hence it is of importance to the reparation of an ulcerated part, to protect it from those sources of irritation. When an ulcerated surface is extensive, and the tone of its vessels much impaired, the discharge is generally so copious as to detach from it all applications calculated to protect it from irritation, and is so injurious or contaminating as to increase the mischief, if allowed to remain any time in contact with it. The first object in such cases is to restore the organic nervous energy, and tonicity of the capillaries of the part, and thereby to diminish the quantity, and to improve the quality, of the discharge. The fluid subsequently exuded on the diseased surface will often of itself serve as a protection; and applications which restore the tone of the extreme vessels, and diminish or coagulate the discharge, whilst they further protect

the part, will then be of service, complete reparation taking place under the eschars or scabs, sometimes thus formed. In this manner, strong solutions of the nitrate of silver, or other stimulating and astringent substances, often act very beneficially on ulcerated surfaces, whether the discharge coagulate on them or not. But this subject will be more appropriately considered hereafter.

176. *c.* In cases of *divided* or *injured parts*, when the blood, or the fibrinous lymph exuded from the capillaries, coagulates so as to protect them entirely from the air, and without allowing coagula or any other substance to remain that may occasion irritation, the healing process often proceeds without any evidence of phlegmasia taking place. When divided parts are brought in contact, after the hæmorrhage from them has ceased, the lymph exuded from the opposing surfaces will first slightly agglutinate, and afterwards perfectly connect them, small capillary vessels penetrating and organising the connecting medium, which will diminish more and more as it becomes firmly organised. In this process, which has been called by surgeons, "*union by the first intention,*" inflammatory action can hardly be said to exist. If it actually take place, very different phenomena present themselves. This process has, however, been described as a consequence of phlegmasia, — probably owing to the circumstance of inflammation actually taking place in some parts or other of the surfaces, the union of which is thus attempted, and which various causes prevent from uniting, and chiefly by exciting inflammation in them. It is very rare that divided surfaces entirely unite without this disease being excited in some portion or other; for incongruous parts or tissues are often brought together, that are incapable of uniting directly. These must necessarily become inflamed, and give rise to the usual consequences of phlegmasia. Moreover the fluids and blood effused from the divided structures, and the ligatures placed upon the larger vessels, are sources of irritation, seldom failing of producing inflammatory action, although the more congruous tissues may have perfectly united. In all such cases, union has taken place in the uninflamed parts only. (See the *Local Treatment of* Inflammation.)

177. VIII. Treatment. —The treatment of inflammation must necessarily be guided by a variety of circumstances and considerations. The chief of these refer, — 1st, to the disease itself; 2d, to the individual affected; and, 3d, to the nature of the exciting causes. — *a.* The character, form, progress, and consequences of the inflammation, existing at the time of treatment, should be carefully weighed, as these severally require very different, or even opposite, indications and means. — *b.* The age, strength, temperament, diathesis, habit of body, modes of living and occupations of the patient, ought also to be taken into consideration, and the treatment modified accordingly. — *c.* The exciting causes, the states of constitutional predisposition, and the predominating influences to which the patient is subjected, should be ascertained as fully as possible, and the means of cure selected with strict reference to them. — As the form and character of the inflammation depend chiefly upon the circumstances here alluded to, I shall discuss the treatment which observation has shown me to be most appropriate and successful in each of the principal forms under which I have described this important class of diseases.

178. i. Treatment of Sthenic Inflammations.— *A. Acute Phlegmasia.* — *a. At an early stage* of all sthenic inflammations, the *indications of cure* are — 1st, to lower general and local vascular action; 2d, to equalise the circulation, and to derive from the seat of disease. Several of the means which are employed to fulfil the *first*, also often accomplish the *second* indication.

179. (*a*) *In order to lower general and local action*, numerous agents are usually prescribed according to the peculiarities of the case. These operate either upon the system in general, and indirectly upon the part affected, or immediately upon the latter, and consecutively upon the former, according to their natures, and the manner of employing them. — *a.* Of those which act in the first of these modes, *bloodletting* is one of the most important. It has been, however, very much abused; and the cure of inflammations has too generally been attempted by it chiefly, or even alone. There are numerous circumstances which either very remarkably limit, or entirely contra-indicate, the employment of bloodletting, in those morbid conditions in general, which have been all denominated inflammation, although differing greatly from each other; and even in this, the least equivocal form of the disease, there are many considerations which should weigh with the practitioner in limiting the amount of the depletion on the one hand, or in inducing him to carry it far on the other. The extent to which it may be prescribed should be determined by the age, strength, temperament, diathesis, and habit of body of the patient;— by the constitutional symptoms; — by the vital importance and structure of the part affected; — by the duration of the inflammation; — by the states of the pulse and of the blood first drawn; — by the effects produced by a former depletion; — and by the condition of the tongue, skin, and urine.

180. If the patient be young and robust, and well nourished — if the disease be very acute, or seated in a vital organ, or serous surface — and if the constitutional affection be of a manifestly sthenic kind, — the quantity of blood taken at first should be very considerable, and it ought to be taken in such a manner as to make a decided impression upon the circulating system as soon as possible — or in a large and full stream, so that the rapidity of the abstraction may assist the quantity in the effects produced upon the disease. As I have recommended in the article Blood (§ 64.), the depletion should be effected whilst the patient is in a semi-erect or semi-recumbent posture, in order that the desired approach to syncope may be more certainly produced, without, however, causing syncope, for the reasons fully explained in the article just referred to. — The first abstraction of blood ought to be instantly followed by the means about to be noticed (§ 196.); but the circumstances now stated as demanding a full or large depletion in the first instance, will require a repetition of it, generally to a less amount, but in strict reference to the local and constitutional symptoms, to the effects produced, to the time which has elapsed from the first

bloodletting, and to the appearance of the blood then taken away.

181. The *pulse*, the *blood*, and the character of the *pain* in inflammations, furnish many useful indications as to the *institution*, the *repetition*, and the *amount* of *depletion;* but they may mislead most remarkably, if the numerous exceptions they afford, and the circumstances in which these exceptions occur, be not taken into account. — In inflammations of vital organs, and particularly of the stomach, of the intestines, or of the substance of the brain or liver, the very intensity of the disease may produce so severe an effect upon the constitution, — so violent a shock to the vital powers, — as to deprive the *pulse* of firmness or tone, and to cause not only an oppressed, but also a weak, small, slow, or an irregular, state of pulse. In such cases the practitioner must not be deterred from bloodletting by this circumstance; for after a few ounces of blood are abstracted, the pulse will become more full, strong, and regular. In all inflammations, especially of vital parts, depletions should be performed with a most attentive regard to the phenomena whilst the blood is flowing; and in cases similar to those alluded to, the effects ought to be most assiduously watched. If the pulse rise in strength, and especially if it become hard, as well as developed or full, the bloodletting may even at first be carried so far, as to make an impression upon the circulation, and to reduce the pulse again in strength and fulness. — When the pulse is open and throbbing, or jerking, as generally observed after copious hæmorrhages, bloodletting will rarely be of benefit, although it has not been already resorted to, and it may be most injurious. Where a moderate bloodletting produces sinking or syncope, without affording relief, it will be injurious to pursue the practice further, if, indeed, it has not already been prejudicial.

182. A hard, tense, or strong pulse, not only requires a very copious depletion at first, but generally also a repetition of it. If a pulse, which was too frequent and too full, is reduced in these respects — or if a hard, constricted, or small pulse is softer and freer — or if a pulse hitherto slow and oppressed has become more natural, — it may be concluded that the bleeding has been of service, and that it may be safely repeated to a less amount, if the symptoms require it. If, on the contrary, the pulse has become weak, hurried, compressible, open, jerking, irregular, or intermittent, without producing relief, the bleeding has already proved injurious, and a repetition of it would be productive of danger. It may be taken as a general rule, that when the pulse is above 110 and compressible, whatever may be the organ inflamed, the system will not bear general bloodletting even in the first instance. The local abstraction of blood, however, with caution, may prove of service.

183. The *appearances of the blood* first abstracted have generally influenced the physician more or less in prescribing a repetition of depletion. But they ought to be considered in strict connection with the other symptoms. The appearances most deserving of notice are — the firmness or looseness of the crassamentum; the proportion it bears to the quantity of the serum; and the presence or absence of buffiness, and cupping of its surface. In the article Blood (§ 96, 97.), and in a previous section (§ 25.), I have fully discussed the appearances of the blood indicative of sthenic inflammations. These should receive attention in practice; but I may here remark, that although a cupped and buffed state of the crassamentum is evidence of an excited state of the circulation, and very frequently attends inflammation, yet alone, or without the presence of other symptoms indicating the propriety of bloodletting, it is no proof that this measure has been indicated, or that its repetition is requisite. When, however, the crassamentum is large, firm, or dense, and the buffy coat is considerable, thick, firm, and tenacious, the other signs of inflammation being present, depletion may be repeated, and occasionally oftener than once. If the clot be loose, has a thin or an irregular edge, and especially if it be small relatively to the quantity of the serum, a repetition of depletion will be injurious. In all cases the appearance of the blood depends much upon the manner in which it is taken, — especially upon the size of the orifice, the posture of the patient whilst the blood flows, and the shape and size of the vessel in which it is received. A buffy, cupped, and firm coagulum will form in a deep or narrow vessel, particularly if the blood flow rapidly; whilst neither of these appearances will occur if it be received in a wide and shallow vessel.

184. The *pain* and other local symptoms ought also to guide the practitioner as to the extent to which depletion should be carried. But these should not be exclusively confided in, for the most violent pains, as shown above (§ 82.), are generally independent of inflammation, and are not abated by vascular depletions. Nor are all alterations of sensibility depending upon inflammations to be relieved by bloodletting; for the most severe pains accompanying asthenic inflammations will very often not be even mitigated by it, although altered sensibility in the sthenic forms, now more especially under consideration, will generally be entirely removed by it, if it be actively and judiciously practiced. As long as pain and tenderness on pressure continue, the pulse being firm, resistant, or constricted, and not very frequent, general bloodletting may be repeated, although some exceptions to this rule may present themselves; but in most of these, local depletions may be employed. If the pain return after having disappeared, or if it become exasperated, although bloodletting has been instituted, a repetition of the measure is necessary, unless the other symptoms obviously forbid it; for, in this latter case especially, the first depletion has only relieved the load which overwhelmed the sensibility of the organ, and a second, or even a third, is requisite to restore the circulation of the part to its healthy state.

185. The *absence of pain* ought to be no argument against resorting to vascular depletion, if other symptoms indicate the propriety of it; for intense inflammation may exist in the parenchyma of an organ, particularly the brain, the liver, the lungs, or the kidneys, and even in mucous or serous membranes, without pain being complained of, or without sensibility being further disturbed than is indicated by a feeling of heat, or of oppression, or of weight.

186. The *functions* of the inflamed organ ought also to indicate the propriety of repeating deple-

tion. When they are restored, then the chief object is attained, and no further loss of blood should be inflicted on the patient; but if they continue to be suspended or disordered, or if they are only partially restored or improved, local depletions, at least, are required, especially if due time have been allowed for the first bleeding to produce its effects.

187. The *tongue* furnishes important indications as to the propriety of general or local bloodletting. When the papillæ are distinct and erect, the tongue being white or loaded, and inclined to be dry, or its edges or point, more or less red, vascular depletions are generally necessary. When the fur on the tongue is erect and white, and the sides and point red, blood may be taken away, if no symptoms contra-indicate the practice. On the other hand, when the papillæ or the fur is flat, and the tongue very moist or watery on its superior surface; when it is broad, flabby, fissured, or lobulated; when its edges are indented by, or retain the impression of, the teeth; when it is pale, especially at its point or edges; when it is tremulous on being held out; and when it is covered by a thick, dark mucus or fur; bleeding is generally inadmissible.

188. When the *cutaneous surface* is hot and dry throughout, depletion will be of service; but if it be cold, clammy, and shrunk, or if it be covered by a hot clammy perspiration, bloodletting will be inappropriate, as the chief objects intended to be accomplished by bleeding are to lower general action and to produce relaxation, and these are already attained. If the *urine* is high-coloured, scanty, and does not deposit a sediment, bloodletting may be practised, if other symptoms do not contra-indicate it; but if the urine be pale, limpid, and copious, it will generally be injurious.

189. Besides these guides to the institution and repetition of vascular depletion, there are various others, appertaining to the organ affected, &c., which should guide the physician; but these do not come under consideration at this place. The age, constitution, and diathesis of the patient, and the other states of predisposition, as well as the exciting causes, however, require some notice. The very young (infants) and the aged should be depleted with caution. Persons of a nervous or lymphatic temperament cannot bear so large losses of blood as those who are sanguine, irritable, or sanguineo-melancholic. In the gouty and scrofulous, in the previously diseased, in the ill-nourished, in the very obese, and in persons of a relaxed fibre, or leucophlegmatic or cachectic habit of body, such losses are generally injurious.

190. The nature of the *exciting causes*, and the *influences, mental and physical*, operating on the patient during treatment, should greatly influence the amount of vascular depletion. Inflammations consequent upon active excitement, or attending vital reaction, are most benefited by this measure; whilst those caused by septic, poisonous, infectious, or contaminating agents, are generally aggravated by it. All the depressing affections of mind, an air loaded with malaria or paludal exhalations, the foul air of hospitals, and the confined atmosphere of large towns, particularly in crowded dwellings, in low cellars, in close lanes or alleys, and in manufactories, frequently not only prevent the good effects of bleeding from ensuing, but also render its institution or repetition injurious.

191. The *prevailing epidemic constitution*, or the general character presented by epidemic and other diseases, should always be kept in recollection, especially as respects the employment of bloodletting. The inflammations which occur in the puerperal states, erysipelas, and the inflammatory complications observed in the courses of exanthematous and continued fevers, vary remarkably in their particular characters, according to the prevailing constitution. At the period of change from one general constitution to another, it is very difficult at once to determine upon the admissibility of bloodletting, particularly as regards the diseases just named, and others allied to them; but close observation of the morbid phenomena, and attention to the circumstances and considerations now enumerated, will lead to a right determination as to this practice. Generally speaking, also, it will be found, that all inflammatory diseases attended by a free state of the secretions; by copious fluid defluxions, particularly from the seat of disease; by a moist or relaxed skin, or irregularity and weakness of pulse; by physical and mental depression, and especially by great despondency, unfavourable anticipations of the result, or indifference to objects of former or natural endearment; will either not be relieved, or will be aggravated, by bloodletting.

192. *β. Local depletions* are often sufficient in many forms, states, or stages of inflammation, to accomplish the ends in view. The circumstances requiring *local*, in preference to *general bloodletting*, are chiefly the following: — 1st, The slighter states of inflammatory action; — 2d, Forms of the disease approaching to, or partaking of, the asthenic condition; — 3d, A stage of inflammation too far advanced to admit of, or to be benefited by, general depletion; — 4th, When venesection has been carried so far as not to admit of its repetition, the disease being either unsubdued or only mitigated, and requiring to be aided by this means; — 5th, When it is desirable to derive from the seat of disease, as well as to deplete moderately; — 6th, When it is wished to remove local congestion of the vessels, and to restore the sensibilities and functions of the affected part; — and, 7th, When inflammations occur in debilitated, nervous, or delicate constitutions, and as complications of febrile, or other diseases.

193. The *modes* in which local depletion should be performed also require attention. When a considerable quantity of blood is to be abstracted, and it is desirable to effect a rapid derivation from the seat of disease, then *cupping* is to be preferred; but when the quantity is to be small, and when the application of warm fomentations and poultices to the part subsequently is likely to be serviceable, then *leeches* are more appropriate. Where the morbid sensibility and situation of the parts prevent the having recourse to cupping, a large local depletion being requisite, then a great number of leeches should be applied. In such cases the fomentations and poultices used to promote the bleeding will act beneficially in soothing the altered sensibility, upon which much of the diseased action depends. When the part inflamed admits of the direct application of leeches, it is often doubtful whether they should be placed upon it or not; for in some constitutions the punctures of

leeches are followed by much local and general irritation, or even by erysipelatous inflammation; and if a small number be employed, they only increase the local irritation and determination, without unloading the vessels of the diseased part. In these cases, depletion by more or less numerous or deep scarifications is sometimes more beneficial than by leeches, especially if the vessels are much engorged. It should also be recollected that bleeding by leeches occasions much greater depression, relatively to the quantity of blood abstracted, than by any other mode, especially in nervous and susceptible persons; and that in some constitutions and situations the bleeding from their bites is not readily arrested. When the vital tone and cohesion of the tissues are much weakened, as in febrile and malignant diseases, a fatal loss of blood may take place from them, if the bites be not watched for a considerable time after they are removed. In some cases, *cupping over the bites* of leeches is very advantageous, in abstracting both a greater and more determinate quantity of blood, in preventing a prolonged and weakening discharge from them, and in determining the circulation to the part to which they were applied.

194. In visceral or internal inflammation it has often been recommended to apply leeches over the seat of disease; but, unless some advantage be expected from the subsequent fomentation, no additional benefit will result from the selection of this situation; and, if an intimate vascular connection exist between the part inflamed and that to which leeches are applied, the blood may be injuriously determined thereby to the former place.—When the phlegmasia is entirely visceral, the application of leeches to that part of the external surface which is over the seat of disease, probably effects as complete a derivation from it as when applied to any other situation; whilst the subsequent fomentation tends to equalise the general circulation, and to determine to the surface of the body.

195. In conclusion, the propriety or impropriety of repeating bloodletting in inflammation, as well as of adopting it in the first instance, cannot be inferred from one symptom or consideration alone. The constitution, habit of body, and previous state of the patient, the condition of the various functions, the increase or decrease of the pain and other morbid phenomena in the affected part, and the other circumstances stated above, should chiefly influence our decision upon these important points of medical practice.

196. *γ. Calomel and opium*, as so ably recommended by Dr. Hamilton, should be prescribed in a full dose immediately after the first bloodletting, whenever the inflammation presents an active or sthenic form. In acute phlegmasia of a vital or important organ, from ten to twenty grains of calomel, and from two to three of opium, and one grain of ipecacuanha, may be given at once. This combination will generally succeed in keeping down the general morbid action to that grade to which it had been brought by the depletion, and in preventing reaction from following thereupon. It will also relax the cutaneous surface, determine to the skin, and thereby equalise the circulation. In some cases, smaller doses, especially of the calomel, may be given, and repeated every fourth, fifth, sixth, or eighth hour, according to the urgency of the case, until a decided effect is produced upon the disease. In all sthenic inflammations, the specific effect of mercury upon the tongue and gums is not readily produced; but as soon as it begins to appear, the mercurial medicine should be relinquished, or the dose of it reduced. It is chiefly in cachectic persons, and in the asthenic forms of inflammation, particularly when vascular action is languid or low, or when there is but little excitement, that mercurials, especially in large quantities, are injurious. When sthenic phlegmasia is seated in serous membranes, or extends to them, the decided use of mercury in the combination just prescribed, or in others hereafter to be noticed, is most requisite, in order not only to aid in the resolution of the morbid action, but also to prevent effusion, or the exudation of coagulable lymph, and the several ill consequences shown to depend upon effusion in its various states.

197. When inflammation implicates serous, fibrous, or even parenchymatous parts, preparations of *antimony*, especially James's powder or tartar emetic, may be combined with the calomel and opium, particularly for phlegmasia of the serous membranes of the chest and of the brain, and for pneumonia, &c.; but when mucous surfaces are inflamed, especially the intestinal mucous surface, *ipecacuanha* is preferable, and it may be given in large doses, as two, three, or four, or six grains, in the form of pill, with a full dose of opium. In many cases, also, *camphor* will be beneficially conjoined with calomel and opium; but when it is to follow a large depletion, or when sthenic inflammatory action is not fully subdued, it should be prescribed in small doses, so as to act as a refrigerating diaphoretic. It is chiefly in asthenic inflammations that full or large doses of camphor are required.

198. The *repetition* of calomel and opium, with or without either of the other medicines just mentioned, as to frequency, or the intervals between the doses, as well as the quantities of both, should entirely depend upon the intensity, the seat, and the other circumstances of the disease. The largest doses already mentioned should not be frequently repeated, unless in the most urgent cases. In some instances it may even be sufficient to give them only after each depletion, or to prescribe also, in the intervals, smaller quantities, as may be required. In the less severe states of inflammation it will be preferable to prescribe much smaller doses, as from two to five or six grains of calomel, and a quarter or half a grain of opium, every four, six, eight, or twelve hours, according to the peculiarities of the case, in combination with either of the other medicines already noticed. After depletion has been decidedly employed, these doses will generally be sufficient, even in the more severe cases, and will often give complete relief, without affecting the mouth, their good effects being manifested chiefly on the general and local states of action, on the skin, and on other excreting organs.

199. *δ. Purgatives.*—Unless it be desired to produce a very speedy effect upon the system by calomel or other mercurials given in the above combination, an occasional or even frequent recourse to purgative enemata will generally be necessary, although purgatives taken by the mouth may not then be requisite. Purgatives, however, are amongst the most important remedies used in the treatment of inflammations; their good effects depending upon several circum-

stances:—1. They evacuate morbid secretions and fæcal accumulations, which injure the organic functions, and depress or otherwise derange the powers of life, and which thereby favour the extension of the local affection, and increase the constitutional disturbance; — 2. They diminish vascular fulness, by increasing the intestinal exhalations, and the secretions of collatitious organs, and thereby lower febrile action;—3. They determine the blood to the digestive mucous surface, and derive it from remote parts. Owing to this last circumstance, they should be given with due caution when the digestive tube, or even when the viscera associated with it, are inflamed. They are more serviceable in some inflammations than in others; thus they are more efficacious in congestions and inflammations of the head, than in similar affections of the abdominal and thoracic viscera. The selection of, and modes of administering, purgatives, also, are matters of great importance; but are so intimately dependent upon the nature of individual cases, that no general rules can be stated as to these topics. The refrigerant purgatives are usually the most appropriate, as the sulphate of magnesia, and other neutral salts, either alone or with the infusion of senna; the bitartrate of potash with jalap; the spirits of turpentine with castor oil; calomel with the compound extract of colocynth, or with jalap, &c. One of the best modes of administering these medicines is to give them at first, or a few hours after a full dose of calomel or blue pill, in briskly cathartic doses, so as to clear out the bowels, and afterwards to keep up a more gentle action by milder and cooling doses, or by suitable enemata, or by both. The operation, as well as the antiphlogistic effects of these, and of other purgatives that may be employed, will be promoted by adding to them the potassio-tartrate of antimony, or ipecacuanha.

200. ε. *Mercurials.*—Although calomel is one of the best purgatives that can be given in this class of diseases, yet it, as well as other preparations of mercury, is often required for its alterative effects chiefly, not only after bloodletting has been practised, and as above advised (§ 196-8.), but also where depletion should not be adopted. In some cases it is necessary to use every means, and even several simultaneously, in order to arrest the usual course of the disease, particularly in inflammations of serous membranes, and of the larynx, trachea, iris, &c.; and one of these means is the rapid production of the specific effects of mercury. These effects being produced, not only is the resolution of the local morbid action thereby favoured, but also effusion is diminished, and the disposition to form coagulable lymph is entirely prevented. Hence mercurials employed with the view of affecting the system are most useful for inflammations of parts which give rise to albuminous exudations; and are either of little service, or even prejudicial, when prescribed for inflammations of cellular or parenchymatous structures, especially if these assume a diffusive, or spreading, or irritative form. In such cases, other means, hereafter to be noticed, will be found more beneficial. But in acute sthenic inflammations, neither mercury nor any other means should interfere with bloodletting. It may assist in subduing, and in removing, several of the effects of these diseases, but it should never wholly supersede vascular depletion in some form or other. In chronic inflammations, however, where alterations of structure have commenced, and where they are but little influenced by depletion, mercury is one of the most efficient means that can be prescribed for the prevention of further effusion, or other change, and for promoting the absorption of whatever deposition may have already taken place.

201. ζ. *Spirit of turpentine* is hardly known as an antiphlogistic remedy; and yet, from an experience during nearly thirty years of its effects, both in sthenic and asthenic inflammations, I believe that none is more deserving of confidence, if appropriately and prudently prescribed. As I have long ago shown (*Lond. Med. and Phys. Journ.* for July and August, 1820.), the operation of this medicine depends upon the dose, the frequency of the repetition, and the combinations of it with other remedies. Hence it may be made available in every form of inflammation. In the sthenic form it is remarkably serviceable after depletions have been duly practised, and it may be used both internally and externally — in draughts, or in enemata — in liniments, embrocations, or fomentations. In all inflammations tending to copious effusion, or to fibrinous exudation, after bloodletting has been resorted to, and more especially when it becomes doubtful whether general depletion should be prescribed, or repeated, or not, this substance, in hands experienced in its operation, is a most valuable remedy. In these cases it should be given in quantity sufficient to act upon the bowels and kidneys,—either one drachm twice or thrice daily, or from three to six drachms once a day, alone or with castor oil. It may also be administered once or twice a day in enemata in larger quantities. Where it is desired to produce as rapid an impression as possible upon the malady, not only should the one mode of exhibition be made subsidiary to the other, but both should be aided by the external use of this substance, in the form of a warm embrocation, fomentation, or epithem. In such cases I have generally directed several folds of flannel, large in proportion to the extent and severity of the disease, to be wrung as dry as possible out of very hot water, to be instantly freely sprinkled with spirit of turpentine, and applied immediately over the affected organ; to be closely covered, when thus applied, by wash leather, or a dry cloth, to prevent evaporation; to be kept thus applied as long as possible, or as the patient may endure it; and to be renewed as circumstances may require. In less severe cases, or at the commencement of inflammation, I have found a single application of this fomentation instantly arrest the disease, without depletion or any other means beyond a purgative medicine having been employed. In chronic inflammations, the *liniments* containing this substance, prescribed in the Appendix (F. 296. 311.), may be used either as such, or as embrocations, or they may be applied over the affected organ, on the surface of warm flannel, in the way just described.

202. The spirit of turpentine, thus employed internally or externally, or both, need not prevent a recourse to calomel, or other mercurials, but may be used, particularly in the more urgent cases, in conjunction with them,—the former aiding the operation of the latter. Although one of the most efficacious means of arresting inflammation and its consequences, there is no remedy that requires more discrimination and experience of its action

and effects, than this. Much of the disappointment sometimes felt as to its operation has been entirely owing to the inappropriate use of it, and to injudicious modes of prescribing it. The practitioner who is well acquainted with its effects, in the various doses and modes of using it, will find it most effective in lowering general action when inordinately excited; in controlling local disease; in arresting the effusion of morbid fluids consequent thereon; and in determining the momentum of the circulation to the intestinal canal, to the urinary organs, or to the cutaneous surface, according as either effect may be desired; and thereby in deriving from the seat of disease.

203. η. *Refrigerants and diaphoretics.*—Of these, the former are generally used in aid of more active measures, with the view of reducing the increased temperature, which aggravates or perpetuates the local morbid action; and the latter are prescribed with the intention of restoring or increasing the cutaneous functions, of thereby equalising the circulation, and of removing a portion of the serous and excrementitious elements in the blood. In many cases, substances acting both as refrigerants and as diaphoretics are most appropriate, or those which exert the former action more readily produce the latter effect. Indeed, whenever vascular action is sthenically excited, the skin being hot and dry, it is necessary to lower the general action, and to give such substances as act in this manner, as the most certain means of procuring perspiration. In the majority of cases, after vascular depletion and other evacuations have been duly employed, the cooling diaphoretics are thus indicated; and, although more active means may be still requisite, particularly those already described, yet these will generally be found useful when taken in the intervals, or as occasions may offer. The diaphoretics which will be found most beneficial are the solution of the acetate of ammonia, camphor, spirit of nitric æther, and a solution, or the wine, of the potassio-tartrate of antimony, which may be variously combined according to the peculiarities of the case.

204. *Warm, vapour,* and *medicated baths* are amongst the most energetic diaphoretics; but much judgment is required in prescribing them; for their effects will entirely depend upon the form, state, seat, and stage of the inflammation against which they may be employed. In acute sthenic inflammations, they should not be resorted to until vascular depletion has been duly employed, and alvine evacuations freely procured. When, however, the stomach or bowels are inflamed, they may precede the use of means for the evacuation of the latter. In chronic inflammations of the internal viscera, or of the joints, fibrous tissues, &c., vapour baths, various fumigating baths, and particularly those with sulphur or camphor, warm baths, especially those containing the decoctions of emollient herbs, or weak alkaline solutions; aqueous vapour with the fumes of camphor, or this latter conveyed around the patient; may severally be brought most advantageously in aid of other appropriate means.

205. ϑ. *Diuretics* are sometimes required in the treatment of inflammations, not merely on account of any derivation from the seat of disease thereby procured, but with the view of reducing whatever serous plethora may exist; and of removing from the circulation, by increasing the action of the kidneys, those ultimate products of assimilation which are liable to accumulate in the blood to an injurious amount, during the febrile state, and thereby to heighten the local affection. With this intention, several of the more refrigerant diuretics may be advantageously employed, especially the spirits of nitric æther, the bitartrate of potash, and the neutral salts in small doses. They may be taken either in the patient's usual drink, or conjoined with the other medicines required by the particular circumstances of the case.

206. ι. *Narcotics* are occasionally beneficial, especially when inflammation is attended by great pain and irritability, and in the sthenic forms after vascular depletion and alvine evacuations have been duly practised. *Opium* and the *salts of morphia* are the narcotics most frequently prescribed, although *hyoscyamus*, *belladonna*, &c. may likewise be employed in some circumstances.—Opium was much recommended for inflammation by medical writers during the seventeenth and eighteenth centuries, and frequently in combination with other medicines; but its use, or rather its abuse, was also greatly condemned. There are few medicines which require greater discrimination than this, and particularly when given in this class of diseases; for the propriety of having recourse to it will entirely depend upon the seat, stage, and form of the inflammation, upon the constitutional symptoms, upon the means previously employed, and upon the dose and combination in which it is prescribed. Dr. ARMSTRONG advised large doses of opium after bloodletting, in a paper published in 1824 in the "*Transactions of the Associated Apothecaries*," under the belief that the advantages derived from the combination of calomel and opium, recommended by Dr. HAMILTON, were entirely to be ascribed to the latter substance alone. In this, however, he was altogether mistaken; for this single remedy is not nearly so beneficial as in combination with calomel and the other medicines mentioned above (§ 196-8.). Nor, indeed, did the practice present any originality; for it had been employed by numerous writers and practitioners long before he advocated it, even before the periods which I have already assigned. Besides other instances in which I had prescribed it with great benefit previously to this time, I attended a case of phrenitis in 1820, with Mr. CARROLL of Walworth, in which three grains of opium were given at one dose, after bloodletting had been carried sufficiently far. In slighter cases, after vascular depletion and the operation of a cathartic, a large dose of laudanum, or of solid opium, has manifestly aided greatly in tranquillising the nervous system, in reducing vascular action, and in procuring refreshing sleep; the patient awaking with a soft or moist skin, and with freedom from pain. Dr. STOKES has recently adduced evidence in favour of this practice, and shown that it is peculiarly beneficial in cases of recent inflammation of serous and mucous membranes, where bloodletting and other antiphlogistic remedies are inadmissible, and where the system is greatly depressed. In most instances, however, opium, or the salts of morphia, will be more advantageously combined with calomel, as above advised (§ 196-8.), or with ipecacuanha, or with camphor, or with James's powder, or the other preparations of antimony. Where pain is so excessive as to constitute the most prominent symptom, it is a most important remedy. When great exhaustion follows bloodletting, owing to its having been carried too far, or improperly resorted to, opium and camphor con-

joined are most valuable medicines; and in the asthenic forms of inflammation especially should never be overlooked, particularly in conjunction with other means. The salts of morphia in similar combinations will be found equally beneficial.

207. The other narcotics, as *hyoscyamus, conium, stramonium, belladonna*, &c., are less useful in inflammations, and not so generally appropriate as opium; and yet instances often occur, in which a large dose of some one of these, according to the features of the case, may be preferred; and, after bloodletting and alvine evacuations have been duly practised, and in the combinations already mentioned (§ 196-8.), will be found frequently of service. The chief recommendations in favour of these are—the circumstances of their not interrupting or suppressing the functions of secretion and excretion, and of their relaxing spasm of circular fibres and canals, as well as allaying irritation. It should, however, be admitted, that when opium is prescribed in large doses, it does not interrupt secretion or constipate the bowels so remarkably as when given in smaller quantities; and that these effects are then frequently even not observed.

208. *κ. Sedatives.* — Of these, *colchicum* is the most active; and in certain kinds of inflammation especially, as the rheumatic and gouty, the most serviceable, when prudently prescribed. In the sthenic forms, also, of phlegmasia, it may often be advantageously brought in aid of other means. When it is desired to promote the secreting functions of the kidneys, and thereby to eliminate from the blood urea and its combinations, or other materials which would increase the local and general affection, if allowed to accumulate in the blood, then colchicum may be made a valuable remedy. Also, when inflammations are attended by a torpid or obstructed state of the liver, this medicine, conjoined with deobstruent purgatives, will be of essential service. In cases attended by very acute pain, or by the effusion of fluids from the inflamed part, it will also be of service, particularly when judiciously combined with other means; but its action should be carefully watched, as in some constitutions it produces most depressing and even injurious effects. It is best conjoined with camphor, the alkaline carbonates, magnesia, the neutral salts, and other purgatives; and is most serviceable after depletion and alvine evacuations.

209. *Digitalis* has been more generally employed than colchicum in inflammatory complaints, although it is a less efficient, and even a more uncertain, remedy than it. As long as vascular action is acute or sthenic, digitalis, even in large doses, exerts but little influence upon the circulation; whilst its cumulative effects will sometimes appear as soon as the symptomatic fever abates. It is most serviceable as an adjunct to other means, whose operation is more decided and certain, especially where effusion has commenced, or is about to commence, from the diseased part; when inflammation attacks debilitated, cachectic, or delicate persons, who cannot bear general or free bloodletting; and when it assumes slight, chronic, or subacute forms.

210. *The preparations of antimony*, particularly the *potassio-tartrate*, given in large and frequent doses, produce a sedative, or, according to RASORI and his followers, a *contra-stimulant*, effect. After causing vomiting, they act upon the bowels and skin, and reduce the pulse in strength, fulness, and sometimes in frequency. For inflammations of the thoracic viscera, and of the brain and its membranes, a decided and judicious use of these medicines, after due vascular depletion, is generally of great service; but they should never supersede this latter, although they may prevent the having recourse to very large or repeated bloodlettings. In other circumstances, as well as in those just instanced, these preparations are very beneficial, particularly when conjoined with opiates or other narcotics; they lower general and local vascular action, relax the cutaneous surface, favour perspiration, and equalise the circulation.

211. The potassio-tartrate of antimony is seldom prescribed as an emetic in sthenic inflammations, unless in those affecting the respiratory organs and passages. In order to procure its depressing effects, a quarter or a third of a grain is usually given every two or three hours. The first two or three doses may cause vomiting, but nausea and a lax state of the skin and bowels will subsequently be the chief effects. Chronic inflammations are often subdued by this medicine, and the most successful results frequently follow it in delicate constitutions, when bloodletting does not promise any decided advantage. It should not, however, be carelessly employed, as I have seen it productive of the most injurious effects when pushed far in debilitated persons, and in young children. In smaller doses, as from the one fifth to the one tenth of a grain at the same intervals, it produces a salutary diaphoresis. To effect this, however, it is seldom given alone, but is usually conjoined with camphor mixture, solution of the acetate of ammonia, the spirits of nitric æther, and sometimes with a small quantity of sulphate of magnesia or of the nitrate of potash.

212. The employment of large doses of tartar emetic in inflammations originated in Italy; and although it was at first discouraged by British practitioners, yet the experience of the ablest physicians in this country and on the Continent has now fully decided in favour of the practice. Since 1819, I have generally resorted to it in the manner just mentioned, especially in the treatment of inflammations of the respiratory organs, and generally with great benefit. There are few cases which, if promptly treated by bleeding, and subsequently by this medicine, will not be very materially relieved; and in those which have been neglected, or in which the proper time of bleeding has gone by, this substance, with mercury, or with the solution of the acetate of ammonia, or with opium if it irritate the digestive canal, or with other appropriate means, will frequently prove of great service.

213. The empirical powder, introduced by Dr. JAMES, is the next to tartar emetic, as an efficacious preparation of antimony in the treatment of inflammations. The *pulvis antimonii compositus* in the *Pharmacopœia*, which was intended as a substitute for it, cannot be depended upon. The different effects of these medicines have been attributed by Dr. THOMSON to the fact of the antimony in the former being a protoxide, which is soluble; in the latter a peroxide, which is insoluble. Mr. PHILLIPS seems to confirm this in his translation of the *Pharmacopœia*. In numerous cases of inflammation, and in many circumstances, *James's powder* should be preferred to any other antimonial. In *children*, particularly those which are very young, and for inflammations of

the pulmonary organs, as well as of the brain and its membranes, in this class of patients, it is generally the best preparation of antimony, and the best sedative, that can be prescribed.

214. *Cold* is one of the most powerful sedatives, and one which is not always judiciously employed. There are few agents which are more efficient in constricting the vessels of the part, than it. Also, by altogether removing the principal stimulus to, as well as the chief consequence of, vascular excitement, namely, increased temperature, it prevents the consequent exhaustion of the tone and vital cohesion of the capillaries and inflamed tissues. Yet, in medical practice, its appropriate use is comparatively limited; for it cannot be brought to act upon the majority of internal inflammations in such a manner as to insure its good effects, or without interfering with other means upon which still greater dependence may be placed. It is also applicable only to the sthenic and acute forms of inflammation; for it is generally injurious in the asthenic and specific varieties, particularly the diffusive, erysipelatous, gouty, and rheumatic. In all cases of visceral inflammation where the application of cold tends to constrict the external surface, and to determine the circulation to internal parts, cold can rarely be advantageously prescribed; for even when employed internally, or in enemata, it can seldom be prevented from superinducing reaction, or be so applied as to keep down vascular action for a continued or prolonged period. It is, however, different with inflammations of the brain or of its membranes; for the comparatively superficial and isolated situation of the diseased parts, their distance from the centre of the circulation, the minute division of the vessels in these organs, and the complete manner in which cold applications may be made to surround the whole seat of disease, — in the form of the cold affusion, the ice-cap, evaporating lotions, &c., — combine to render cold more beneficial in these inflammations, than in any others affecting internal organs.

215. It has likewise been recommended to employ cold in the treatment of other visceral inflammations, as in pneumonia, enteritis, peritonitis, &c. Breathing very cold air has been tried in the first of these by practitioners of the United States of America, and cold applied to the abdomen in the others by Dr. SUTTON and by several German physicians, but with very doubtful advantages. Indeed, the results of such practice may be tolerably accurately inferred *à priori*.

216. Amongst other sedatives, mention may be made of the *tepid bath*, and the *tepid affusion* or *douche*. These, by abstracting heat, exert a depressing effect, and slightly constrict the surface. When the heat of skin is very considerable, the pulse being rapid and somewhat hard or resistant, the tepid bath is to be preferred to the warm bath, as it not only cools the surface, but also generally favours diaphoresis with more certainty than this latter. Indeed, in acute sthenic inflammations, the warm bath should not be used of a higher temperature than 96°, unless in cases presenting peculiar features. The tepid bath, or affusion, is frequently more appropriate in the early and acute stages of inflammation than the cold on the one hand, or warm, vapour, or medicated baths, on the other; as it gradually reduces the temperature without favouring the occurrence of reaction. Warm, vapour, and medicated baths are most serviceable at advanced periods of inflammation, after evacuations have been freely procured, or when the disease becomes chronic or complicated.

217. *The abstraction of all causes of irritation*, as well as of the exciting causes of the disease, is obviously requisite in the treatment of inflammation. The excitement of the senses, especially of the organs of sight and hearing, and of the mental faculties, should be carefully guarded against. Muscular action, and stimulation of the stomach by heating food and beverages, ought also to be prevented; the antiphlogistic regimen being strictly enforced in all its parts.

218. λ. *Derivatives and counter-irritants.*—These should never be employed until the general vascular excitement is subdued by bloodletting and other evacuations; and until a powerful impression has been made upon the local affection. These ends being attained, the *mode* of derivation or counter-irritation should next be considered. This should depend upon the seat, form, and duration of the inflammation, and the consequences to which it may already have given rise.—In acute cases, and at early stages of the disease, the *hot turpentine epithem*, or application, already described (§ 201.), is the most efficacious, the safest, and the most immediate in its effects. It should always be applied over the inflamed organ, or as near it as possible. It is applicable to all forms of inflammation, in whatever organ they may be seated. It tends, more than any other derivative, to determine the circulation to the cutaneous surface, and to prevent the more dangerous consequences of the disease.

219. *Sinapisms* are extremely serviceable, and produce their effects rapidly, but they are less efficacious than the turpentine epithem. — The application of the strong *solution of ammonia*, with tincture of camphor and spirit of rosemary, as advised by Dr. GRANVILLE, is also of use, and especially in weak, irritable, or nervous persons, and when inflammatory irritation is attended by much pain. It produces a very rapid effect, and either a superficial and slight, or a more severe and caustic, action, according to the duration of the application. — The liniment employed as a counter-irritant by the notorious empiric, St. John Long, was recently analysed by Dr. MACREIGHT, who found it to consist of oil of turpentine and acetic acid, held in suspension by yolk of egg. Having prepared a liniment consisting of *one ounce and a half of oil of turpentine, of one ounce of strong acetic acid, three ounces of water, and the yolk of one egg*, the three last being rubbed together, and the first being afterwards added, Dr. MACREIGHT found it, in its sensible properties and effects, to be identical with the empirical medicine. That a liniment consisting of these ingredients should prove of essential service in many cases, cannot be doubted. For upwards of twenty years, and for several years before this fashionable empiric appeared, I had frequent recourse to a liniment, consisting of equal parts of the compound camphor liniment and the compound turpentine liniment, with a little cajuput oil, as a counter-irritant; varying it, however, according to the peculiarities of the case, and as prescribed in various parts of this work, and in the APPENDIX (see F. 296. 311.). When this liniment, or any of the others just referred to, is applied on the surface of

warm flannel, or of a cloth wrung out of hot water, over the situation of internal or deep-seated inflammations, it produces an almost immediate effect. But friction during ten or fifteen minutes with the cold liniment will give rise to erubescence, sometimes to exudation, and more or less decided relief. In acute cases, the former mode of application may be adopted; but in chronic or sub-acute inflammation, particularly when alteration of structure has taken place, repeated frictions with this liniment, short of inflaming the skin, are often to be preferred. When the irritation produced by it gives rise to vesication or abrasion of the cuticle, the parts soon heal; but it is frequently of service to continue this effect for some time, by the repeated or prolonged use of the application.

220. *Blisters* may be employed as counter-irritants in three modes: — 1st, as rubefacients; — 2d, as simple and slight irritants; — and, 3d, to procure a puriform secretion from the part. In acute inflammations they ought not to be prescribed until bloodletting has been carried as far as circumstances will permit; and in early periods of the disease, they should not be applied longer than seven or eight hours, and a warm bread and water poultice should be placed over the part, to promote the vesication, and to prevent the irritation sometimes consequent on them. It will occasionally be advisable to place tissue paper between the blister and the surface. On *children*, blisters ought not to be applied longer than from three to six hours, and warm poultices should generally replace them, and be renewed frequently. For sub-acute and chronic inflammations, or for the advanced stages of the acute, blisters may be prescribed for a longer period, and sometimes with the intention of procuring a sero-puriform discharge from the blistered surface.

221. *Warm pediluvia*, the *hip-bath*, and the *semicupium*, are often useful modes of derivation, when the head or the thoracic viscera are affected, or when it is desirable to excite the uterine discharge. Their effect will generally be promoted by the addition of mustard and of common salt to the water. But, in acute inflammations, the temperature should not be too high, or such as may heighten the general vascular action. They also ought not to be resorted to until depletion and alvine evacuations have been duly practised. Besides these, there are other substances sometimes used to produce counter-irritation and derivation, as *croton oil*, the powder or tincture of *capsicum*, bruised *garlic*, and scraped *horseradish*. They quickly produce a rubefacient action when applied on the skin; but are not so efficient in the severer cases of acute inflammation, as those previously noticed. They are all, however, often of service, particularly in the slighter forms of the disease, that are attended by acute pain. Besides these, *cupping* with scarification, and *dry-cupping*, are serviceable modes of derivation in the sthenic forms of phlegmasia.

222. The foregoing modes of counter-irritation are most serviceable in recent, acute, or sub-acute inflammations. Those which are about to be noticed, act chiefly as suppurants, and are most suited to the chronic states, or to the more advanced stages, or rather to certain of the consequences, of the acute and sub-acute forms of inflammation. They consist chiefly of ointments or plasters containing the *potassio-tartrate of antimony*, or *cantharides*, or *savine*; the decorticated *bark* of the *mezereon root*, moistened in water or vinegar, and applied to a small portion of the cutaneous surface; *croton oil*, either alone, or suspended in twice the quantity of camphor or soap liniment or olive oil; *issues* and *setons* of various forms and kinds; *moxas*, and the *actual* and potential *cauteries*. The exact circumstances requiring either of these means in preference to others are so numerous, — the choice of them depending so entirely upon the seat, peculiarities, and stages of the disease, upon the constitution and diathesis of the patient, and upon the other remedies employed, — that no general rules can be stated for the guidance of the inexperienced in this respect; the powers of observation, experience, and views of the practitioner must be his chief guide in the adoption of these, as well as of many other means of cure.

223. It has been very justly remarked by my early friend and former colleague, Dr. Dunglison, in his very judicious observations upon the use of revellents in the phlegmasiæ (see his excellent work, entitled, *General Therapeutics, or Principles of Medical Practice, &c.* 8vo. Philadelph. 1836, p. 363.), that when we are desirous of maintaining a succession of revulsions, or a constant revulsion, we employ either repeated blisters, or keep the blistered surface discharging by applying some of the other means just mentioned. Tartarised antimonial ointment is well adapted for chronic inflammations, as of the lungs, — because, whilst the pustules induced in any one part of the exterior of the thorax, or elsewhere, are going through the stages of increment and maturation, a fresh crop may be elicited on some other part of the chest; and thus a succession of irritations can be developed, which is more beneficial than one that is more permanent.

224. It is of importance to determine the *extent of surface* to be affected by a revulsive application. This is not always so easy a matter as may be supposed; for, if the vital conditions be affected by it in a very limited extent of surface, the morbid action, intended to be remedied, may be entirely uninfluenced by it: and, on the other hand, if a very large surface be irritated, constitutional disturbance will be thereby excited; or that depending upon the primary disorder, as well as the disorder itself, will be aggravated or perpetuated. — As to the *time*, during which the counter-irritation should be maintained, but little can be stated; for it must depend almost entirely upon the circumstances of the case. On this topic, Dr. Dunglison remarks, that it is chiefly when the diseased action has been prolonged for a considerable period, and in affections of a neuralgic kind, that sudden and violent revulsions are productive of the most marked advantage. In the different phlegmasiæ, revulsions which implicate a greater extent of surface, and are more prolonged in their action, are decidedly preferable. In the former cases, moxas and the cauteries may be employed; in the latter, rubefacients and vesicants.

225. The permanence or remittence of the counter-irritation deserves consideration in every case for which this means is prescribed. In most of the phlegmasiæ, remittent revulsion is more serviceable than a prolonged or permanent revulsion. Dr. Dunglison justly observes, that when an artificial irritation, accompanied or unaccompanied with increased secretion from the part, has been

established for some time, it ceases, in a great measure, to be a morbid condition, and cannot be arrested without an inconvenience, or risk to some organ predisposed to disease; but if a succession of irritations be produced, the system never becomes habituated to them, and the repetition of the irritation, after a short period, is as beneficial as at first. A succession of vesicants, therefore, is to be preferred to a more permanent application; setons and issues losing much of their beneficial influence in the latter periods of their employment.

226. BROUSSAIS, and many of his followers, have contended that revulsive irritations should be stronger than the morbid action they are intended to replace, otherwise they tend to increase the latter; but although it is manifestly necessary to reduce the inflammation as much as possible by depletions, before counter-irritants are prescribed, yet great good will result from the judicious use of them. There are also several that may be very safely employed early in some of the phlegmasiæ, and even before depletions have been practised, as the turpentine epithem, liniments, &c. (§ 201. 219.). I therefore agree with Dr. DUNGLISON, in believing that good will be derived from revulsants in appropriate cases, even should they fall short of the precise degree necessary for completely putting an end to the disease for which they were prescribed.

227. The *situation* to which revulsants or counter-irritants should be applied, relatively to the seat of inflammation, is deserving of attention, especially as a contrariety of opinion exists on the subject. And yet the very terms here used ought to guide the practitioner to the application of them to parts which are not supplied with branches of the same nerves and blood-vessels as proceed to the seat of disease. Much, however, should depend upon the nature of the adopted revulsant; for the turpentine epithem or embrocation will never be injurious, but generally beneficial, however close it may be applied to the inflamed organ. But it is different with blisters and other counter-irritants. I cannot agree with Dr. THOMSON's and Dr. CHAPMAN's recommendation to place these "as near as possible to the affected part." I have often seen mischief result from the early application of a blister to the scalp in meningitis and encephalitis, and to the throat in laryngitis and tracheitis. When, however, the inflammation is of an asthenic or adynamic kind, or when the sthenic form has given rise to effusion, blisters, as well as several other counter-irritants, may generally be applied close to the diseased organ. Yet, even in these circumstances, exceptions to the rule are not few. The choice of situation must therefore depend upon the seat and character of the phlegmasia, and other peculiarities of the case: precise directions respecting it can be given only when discussing the treatment of particular inflammations. In all cases the choice should be guided, as M. BEGIN remarks, by sound physiological principles; for they only can render this mode of practice more certain than it has hitherto been, and prevent the inconveniences which often follow it.

228. It has been already stated that blood-letting, both general and local, may be so instituted in several of the phlegmasiæ, as to derive from the seat of disease. The older writers paid much attention to this method of depleting. Bleeding from the saphena vein, the feet and legs being immersed in warm water, was often prescribed for phlegmasiæ of the viscera, and particularly when consequent upon suppressed evacuations: and bleeding from the vicinity of the anus by leeches is generally adopted by foreign physicians, for inflammations of the liver, stomach, &c. Indeed, to derive the impetus of the circulation from the seat of the phlegmasia by vascular depletion, by cathartics or other evacuations, and by counter-irritants or other revellents, both internal and external, must always be a principal indication of cure, in this class of diseases.

229. *μ. Of applications to the inflamed part itself*, there are some that require a particular notice. They may be all comprised and considered under the following modes of operation: — 1st, Those which reduce the temperature, and thereby remove one cause of morbid irritation, and of vascular expansion; — 2d, Those which soothe the morbid sensibility or diminish pain, either by their influence upon the affected nerves, or by diminishing the tension, rigidity, or pressure of parts; — 3d, Those which constringe the expanded capillaries, restore their lost tone, and prevent the stagnation of the blood or promote the circulation in them; — and 4th, Those which protect the part from external irritants, &c. It is obvious that many local applications produce benefit by acting in more than one of these modes; but still they may be referred to one or other of these especially. Moreover, many internal means of cure act upon the part affected, particularly in visceral phlegmasia, in one or other of these ways. As *topical means* are applicable chiefly to external inflammations, which are generally viewed as belonging to the province of the surgeon, my remarks respecting them will be as brief as the importance of the subject will permit. Yet it must not be overlooked, that most external inflammations, particularly when spontaneous, are merely symptomatic of constitutional disorder — are only the external manifestations of visceral or general disturbance, or of hereditary vice, — that they all react upon the frame through the medium of the organic nervous and vascular systems, — and consequently, that, whilst local remedies form only a part of the treatment required, the rest being employed with reference to the internal and constitutional affections, the entire treatment, even in the external phlegmasiæ, is more strictly medical than surgical, if, indeed, the distinction should be at all entertained.

230. (*a*) *Of those applications which directly reduce the temperature*, some notice has already been taken (§ 214.). They have generally the effect, not only of removing a principal cause of excitement and irritation, but also of constricting the morbidly expanded vessels. *Cold applications* are, however, often injurious, and consequently inappropriate or hazardous, whenever the external inflammation is merely the outward expression of internal or constitutional disorder, as in gout and erysipelas: they are less so, however, in sthenic than in asthenic or specific inflammations. For in the sthenic phlegmasiæ, the vital energies are capable of resisting their sedative influence, and the suppression of the local affection rarely endangers internal viscera. But in the other kinds of inflammation the repulsion of the external affection often caused by these applications is frequently followed by serious internal disease. In such cases the source of mischief is in the frame,

and in some important or vital organ; and when the effects are prevented from appearing externally, they often break out in some internal viscus.

231. Of the numerous *cold applications*, there are few which are preferable to the *solution of the di-acetate of lead*, inasmuch as it combines astringent with cooling and sedative properties. But this, as well as the common *cooling* or *evaporating lotions*, and *cold or tepid water-dressings*, should be suited to the intensity of the inflammations, and be used unremittingly, until the local affection is subdued; for if employed only at intervals, or if at all intermitted, reaction will take place in the inflamed part, and the disease will be thereby aggravated, or at least perpetuated. We observe this in the treatment of *scalds* by cold applications, when used in this latter mode. When the inflammation is of a specific or asthenic kind, and when it is attended by great tumefaction and excessive pain, or when cold applications do not give relief to the pain in a short time, they ought either not to be employed at all, or not to be continued, but give place to very different means. Also when they produce general chilliness, they ought not to be persisted in.

232. (*b*) *Applications which soothe the morbid sensibility* are perhaps more generally appropriate, and are certainly less dangerous in the symptomatic or specific phlegmasiæ just alluded to, than those which are cold. They all more or less diminish the tension of rigid and unyielding tissues, lessen pressure on sensitive parts, and have an emollient and soothing effect. *Moist warmth*, employed in various ways, but especially in the form of *steam, simple and medicated*, and of *fomentations, poultices*, and *warm baths*, also either simple or medicated, &c., is the principal agent by which the physician or surgeon produces these effects. *Steam*, or warm aqueous vapour, has lately come into notice in the treatment of inflammations; and we are indebted to Dr. MACARTNEY and Dr. WILSON for a knowledge of its virtues in respect of its topical external use; for as regards its internal employment by *inhalation* in affections of the respiratory organs, it has been long prescribed. (See ASTHMA, and BRONCHI — *Inflammations of*.) In the form of the vapour bath, it has also been generally used, particularly in circumstances already noticed (§ 204.). By very simple yet suitable appliances, *steam*, either of water alone, or of water containing various *narcotic* or *emollient herbs* or *extracts*, or *camphor*, or *acetous* or *terebinthinate substances*, may be brought in contact with, or entirely surround, the seat of inflammation. It may likewise be *inhaled* into the lungs for the affections referred to, either in its simple or medicated states. When employed externally, and particularly to a limited extent of surface, it should be continued for a very considerable time, and at a somewhat higher temperature than when inhaled. The substances, also, whose fumes are conveyed in the vapour or steam, may be used in much greater quantity when applied thus externally and locally, than when prescribed internally. *Fomentations* and *poultices* containing emollient, narcotic, or other medicines, are also efficacious, not merely by the moist warmth they afford, but in great measure by the impression made upon the nervous tissue by the particular medicinal substances they contain. The same remarks apply to medicated warm baths.

233. It is principally for inflammations attended by excessive pain, by much constitutional irritability, by a very frequent and irritable pulse, and depressed vital powers, that the warm and soothing applications now mentioned are required. Hence they are generally appropriate in the specific and asthenic inflammations: and in them especially afford very great relief, particularly when brought in aid of judicious internal treatment and suitable regimen, and employed early in the disease.

234. (*c*) Applications which constringe the expanded capillaries, restore their lost tone, and prevent the stagnation of the blood, or promote the circulation in them, are suitable to certain states of the advanced stages, and to some of the consequences, of sthenic inflammation. They are also appropriate to most of the specific and asthenic phlegmasiæ from their commencement. When the former proceeds to ulceration, and especially if this assume a spreading or phagedenic form, the more energetic astringents, as the various *turpentines* and *balsams*; certain *metallic salts*, particularly solutions of the sulphates of zinc, of copper, iron, &c., of the nitrate of silver, and of the acetates of lead, zinc, &c.; the dilute *mineral acids*; solutions of the *chlorinated soda*, of the *chloride of lime*, and of the *chlorate of potash*; various *vegetable astringents* and *tonics*; *creasote, camphor*, the *vegetable acids*, &c.; are severally beneficial in such circumstances, when suitably prescribed and combined with other appropriate means — in some instances with narcotics, and in others with mucilaginous or albuminous substances, — occasionally in aqueous vehicles, and sometimes in unguents, cerates, &c. It is chiefly, however, when the states or consequences of inflammation just noticed are external or near the surface, or within reach, that applications containing any of these are found useful; yet even when seated in internal surfaces, as in the intestinal and respiratory, they are occasionally beneficial, employed either in the form of draught, pill, and enema, or by means of the inhalation of aqueous vapour partially charged with the fumes of some of them. Although it is chiefly for the advanced stages or consequences of asthenic inflammations that astringent substances are required, yet the early and acute stages are also sometimes benefited by them, however stimulating or irritating they may seem to be. Thus, in scalds, and in certain states of burns, the application of a cloth wetted with spirits of turpentine will generally not merely afford relief, but hasten resolution of the inflammatory action. In such cases it may be truly said with SHAKSPEARE that,

> "One fire burns out another's burning."

235. (*d*) Substances which protect the inflamed surface from the irritating influence of the air, and of the exhalations floating in it, are extremely beneficial in all cases in which the part is abraded or its continuity injured. They are, however, less useful when they prevent the morbid secretion of the inflamed part from being discharged. In most cases, therefore, they should be so employed as to prevent any accumulation of this secretion from taking place, whereby the surrounding tissues might be contaminated. Most of these substances are advantageously made the vehicles of astringent or detergent medicines, thereby diminishing the discharge by constringing the extreme vessels, as well as excluding a chief cause of irritation, and of

the consequent morbid secretion. The principal advantage derived from plasters, cerates, ointments, &c., is owing to the exclusion of the air by them from the abraded or divided surface. In many cases of injury, the fibrinous lymph exuded from the extreme vessels, by coagulating over them, protects them from irritation; and were this natural protection more frequently allowed to remain, and confided in, inflammation would less frequently supervene on these cases, than it otherwise does. The albuminous exudations, formed on superficial ulcerations and inflammations of exposed surfaces, protect them in a similar manner, and dispose them more readily to heal; and if the inflammatory action should at any time be exasperated, so as to give rise to an increase of the morbid secretion or to the production of pus, underneath the protection thus formed, the mischief will often soon subside, and the secretion become absorbed, the parts healing under the scabs, or dried lymph or albumen, covering them. Superficial sores, when protected by the *white of egg*, often heal underneath; and dressings with this substance, by entirely excluding the air, are often more serviceable, in preventing inflammation after incised wounds, and in promoting union, than any other. Strong solutions of the *nitrate of silver*, or of *sulphate of copper*, or *sulphate of zinc*, or other *astringents*, applied to ulcerating surfaces, not only excite the organic nervous tissue, and constringe and give tone to the exhausted extreme vessels; but they likewise coagulate the albuminous portion of the secretion, and thereby protect the part against the iritating influence of the air. They also change the morbid secretion, causing it to assume a more healthy character. Substances which either simply protect a raw inflamed surface, or act in the more complex manner just mentioned, are especially serviceable in cases exposed to the influence of impure air, whether the impurity proceeds from terrestrial exhalations, or from animal emanations, as in the wards of an hospital, or in close, low, or crowded habitations.

236. ii. Treatment of Asthenic Inflammation.— When phlegmasia presents the asthenic form, the treatment should be very different from that recommended above. The states of organic nervous power and of vascular action differ from those attending the sthenic conditions; and as the differences are great, so should the indications of cure, and the means employed to accomplish them, be different. As all the modifications of asthenia depend chiefly upon two classes of circumstances,— upon depressed conditions of the constitution, and weakened functions of the viscera concerned in assimilation and excretion, and upon the sedative, poisonous, or septic nature of the exciting causes,—so all the indications of cure ought to be determined, and the remedies selected, with strict reference to these circumstances. If the local phlegmasia is associated with, or consequent upon, general asthenia or debility, vital power must be augmented by suitable means; otherwise the local disease will more readily terminate unfavourably, especially if it exist in much intensity. If, in addition to general or constitutional adynamia or asthenia, there be impaired excretion, and consequently accumulation of effete elements in the blood, or deterioration of it, not only must vital energy be supported or roused, but also the excreting or eliminating functions must be excited, and means employed which may correct or change the morbid tendency or conditions of the blood; for if these ends are not attained, the structural lesions which the inflammation rapidly induces, instead of being arrested, or terminating in spontaneous resolution, would be rapidly accelerated, and themselves become the source of further local disorganisation, and of constitutional contamination.

237. Asthenic inflammations, whether depending upon original, acquired, or accidental states of the frame, and of the vital organs, or proceeding from specific causes, require a treatment directed more strictly to the conditions of vital power and function — to the constitutional affection and the existing visceral disorder — than to the local disease; and they moreover require this kind of treatment much more than the forms of phlegmasia already considered. In the latter, the constitution and the vital organs have generally been either unimpaired or not materially affected, before the local disease originated and drew them within the circle of its sympathies; in the former, either the constitution, or some important viscus, or both, have been seriously deranged before the inflammation appeared, — this latter being either the consequence of, or an accidental contingency upon, such derangement, and depending upon it in its subsidence, as well as in its appearance. Even when the asthenic forms of inflammation more especially proceed from specific or septic causes, still very much of their local characters and of their constitutional effects depend upon pre-existing states of vital energy and of the assimilating and excreting functions. To these, in their antecedent, as well as in their existing conditions, the attention of both physician and surgeon ought to be mainly directed; and neither the one nor the other will discharge his duties, if he does not connect the forms and changes of the local affection with the constitutional disorder and the visceral derangements, and treat each of them with strict reference to the rest.

238. Although *indications of cure* should not be followed in succession, nor acted upon individually, and without regard to their joint operation,—although attempts at accomplishing one intention, without endeavouring to attain others at the same time, should not be made in asthenic, any more than in sthenic, inflammations,—yet it will be necessary to have just ideas, as to the principal objects to be attained, in order to arrive at a successful issue; and as to the importance and applicability of them severally in the treatment of each particular case. These *objects* or *intentions* should be entirely based upon the characters assumed by the constitutional commotion, by the visceral disorder, and by the inflammation,— the seat and cause of the phlegmasia, and the circumstances immediately connected with the patient, being also taken into account. Upon these, the activity with which each indication of cure should be pursued, and the importance assigned to one or more of them, should chiefly depend. Influenced by these considerations, and by the phenomena and progress of asthenic phlegmasiæ, the physician, in their treatment, will propose to himself —1st, To promote organic nervous power, and thereby to enable the constitution to resist the progress of the local disease; —2dly, To preserve

or to restore the healthy state of the circulating fluids, and the crasis of the blood, by promoting the excreting or depurating functions, and by other appropriate means;—and, 3dly, To assuage the urgent symptoms referrible either to the local malady or to the constitutional affection. The means which most efficiently fulfil the *first* of these intentions, will generally also promote the attainment of the second and third; and whatever has the effect of accomplishing the *second*, will also most materially advance the other indications.

239. *A. The constitution will generally be enabled to resist the local progress of the malady*, by whatever increases the tone or energy of the organic nervous system, through the medium either of the digestive canal, or of the respiratory organs, — by means of appropriate tonics and stimulants, and by a dry, pure, and temperate air, duly renewed. All asthenic inflammations have a tendency to spread or to extend themselves with a greater or less rapidity, and to terminate unfavourably,—the changes that successively arise, tending to gradual disorganisation, or to more immediate sphacelation. Unless under the influence of agents which rally the constitutional powers, they seldom or never show a disposition to spontaneous resolution, as often observed in sthenic phlegmasia. The only exceptions to this rule are met with in those asthenic inflammations which constitute a part of specific constitutional maladies; and these are mere symptoms, or parts only, of these maladies, and are generally co-ordinate with and dependent upon them, in their rise, progress, and decline. This tendency to spread, and to give rise to a succession of unfavourable changes, constitutional as well as local, requires agents possessing powers of sufficient activity to meet the intensity of the disease. As this tendency depends upon depressed organic nervous energy, and deficient vascular tone, as shown above (§ 58.); and as the permanent fluidity of the effused fluids, and their infiltration, and contamination, of the surrounding tissues, depend upon these pathological states; it is obviously requisite to employ such means, as attentive observation and enlightened experience have proved to be most efficient in removing them. All parts which are the seat of asthenic inflammation rapidly lose their vital cohesion or tone; and this loss is participated in, not only by the extreme vessels, giving rise to a copious morbid effusion, but also by the tissues affected. The chief pathological conditions, from which all the consecutive changes have been shown to proceed (§ 162. *et seq.*), manifestly require an energetic recourse to those means which will enable the constitution to resist the progress of the local mischief. Where cellular or adipose tissues are implicated, the extension of disease, and even of disorganisation, will be rapid, if organic nervous energy be not promoted, and if vascular action in the seat of inflammation be not changed, by suitable remedies. In such cases, the constitution must be enabled, as John Hunter ably contended, to form coagulable lymph, either in, or around, the inflamed part, — or, in other words, to change the fluid and often septic matter effused in the areolæ of the tissues, that extends the mischief by infiltrating and contaminating them, into coagulable lymph or albumen, whereby these areolæ may be rendered impervious to the more fluid part of the effused matter, and the progress of the local malady may be more readily limited.

240. The *principle* of treatment in asthenic inflammations being established, the *means* by which it may be most successfully carried out in practice will be readily found; although the application of these means, appropriately to the varying phases of individual cases, requires great discrimination and care. In the truly asthenic forms of phlegmasia, the principle contended for must be acted upon with decision, and without wavering or temporising. In the treatment of them, doubt or hesitation is fraught with danger; and proceeding, as either generally does, from ignorance of the true source and relations of the local malady, there will be every reason to fear that much of both positive and negative wrong will be further perpetrated. The ignorant are usually presuming; and the half informed, self-sufficient. In other professions and avocations, the evils produced by both are comparatively trivial; but, in the practice of medicine, their consequences are of fearful and immeasurable importance to humanity. I have seen numerous cases of asthenic inflammation die in succession, without the occurrence of a single instance of success to lull the suspicion that true principles of practice had not been adopted; and yet the same principles were blindly pursued in each successive case. In a country where the most trivial invasion of the rights of property is visited by the most condign punishment, human life may be sacrificed to an extent that more than rivals both the pestilence and the sword, by ignorant pretenders to medical knowledge — by the totally uneducated as well as by the half instructed,—and not merely with perfect immunity from punishment, but actually with the protection of the government, that protection being virtually the most complete for those whose ignorance is the greatest! This sacrifice of human life, be it further recollected, is constant and unceasing — not occasional only, or at long intervals, as that caused by epidemics, pestilences, and wars. — It was said, upwards of two hundred years ago, by a celebrated Archæologist (Sir H. Spelman), "that whilst every thing else had risen in nominal value in England, the life of man had become continually cheaper." What would he have said, had he lived in the present day?

241. The *means*, by which the indication or practical principle above contended for is to be fulfilled, must necessarily vary with the circumstances of the case; but the decoction of *cinchona*, or the infusions of *cascarilla* and of *gentian*, &c. with the *alkaline carbonates* (F. 381. 385. 387, 388. 445. 869.), are generally beneficial, especially when aided by warm aromatic tinctures or spirits. When the pulse is very quick, soft, and weak, and when the patient is physically and morally depressed, the *chlorate of potash*, *serpentaria*, or other stimulants, may be added to the above (F. 415—417. 437—439.). In these cases, *camphor* in full doses, the preparations of *ammonia*, and *capsicum*, or other spices and aromatics (F. 845. 852.), may likewise be prescribed. In all asthenic inflammations, the excretions, and the fluid effused in the diseased tissues, are more or less acid,—a state which is most readily corrected by the alkaline carbonates, conjoined with tonics and aperients. In many cases,

however, the preparations of *chlorine*, particularly the *hydrochloric acid*, the *hydrochloric æther*, and *chlorinated soda*, prescribed with tonic vegetable infusions or decoctions, and with camphor, aromatics, &c., are equally beneficial with the foregoing (F. 847, 848.).

242. *B.* But, in order to promote the powers of life, and thereby to enable the vessels of the diseased part to form coagulable lymph, whereby the progress of mischief may be arrested, it is necessary, not only to excite the organic nervous system, but also *to depurate and to correct the circulating fluids by appropriate medicines.* This intention will be fulfilled chiefly by promoting the excreting functions by mild *purgatives*, conjoined with *tonics* and *aromatics*, as the compound *infusions of gentian and senna* with the alkaline salts (F. 266.), the compound *decoction of aloes* with warm aromatic tinctures or spirits, or the infusions of *rhubarb* and *cinchona* (F. 55. 387. 433.), or other similar remedies (F. 53. 215, 216. 872.). In the intervals between the exhibition of these, tonics and stimulants should be selected, and given in doses and combinations suitably to the seat and urgency of the disease. If the purgatives just mentioned act insufficiently, a dose of oil of turpentine and castor oil (about half an ounce of each) may be taken on the surface of milk, or of any aromatic water (F. 216.), and enemata containing the same oils (F. 135. 151.) administered according to circumstances. If the biliary secretion be suppressed or interrupted, *calomel* or PLUMMER's pill may be given at bed-time, with *camphor;* and a draught containing the oils, or either of the above purgatives, may be taken in the morning. The combination of the mild alkaline salts, or of the chlorate and carbonate of soda (F. 439.), with the foregoing tonic or other medicines, will generally correct the circulating fluids, diminish the contaminating influence of the matter effused in the seat of disease, and further promote the fulfilment of the present indication.

243. *C.* From the commencement of the treatment, it is often requisite *to mitigate the more urgent local and constitutional symptoms.*—*a.* The remarkable pain and tumefaction of the inflamed part are best relieved by anodyne fomentations, by warm bread and water poultices, or by the local application of simple or medicated steam. In the more complete forms of asthenic inflammation, no advantage will accrue from the application of leeches to the inflamed part; although a recourse to incisions of the integuments, as recommended by Mr. A. COPLAND HUTCHISON, and others, will often be of service, when cellular and adipose parts are the seat of disease, and the tension is very great. I have seen also the application of a cloth moistened with oil of turpentine have a very remarkable effect both in mitigating the pain, and in lessening the tension and tumefaction. It should be applied warm, and covered with wash-leather or oil-skin to prevent evaporation and cold. In several cases, where the swelling has been most extensive, — the whole limb to the trunk having been affected,—I have seen it subside very quickly after a decided recourse to the internal and external treatment here recommended. In most of these cases, the tone of the vessels has been rapidly restored, congestion of them removed, and the effused fluid absorbed, without coagulable lymph having been formed, or suppuration having supervened, excepting in some instances at the point of injury, or where the disease originated. When this treatment is early resorted to, not only is the progress of the disease arrested, but also much of its more immediate effects is removed, without the lesser evil, the formation of fibrinous lymph, for which JOHN HUNTER contended, having taken place.

244. *b.* At advanced stages of asthenic phlegmasia, more frequently, and even at early periods occasionally, excessive *pain* and general *irritability* call for a prudent yet decided recourse to *narcotics*. In these cases, a lowering treatment will neither mitigate the pain nor diminish the other symptoms, but, on the contrary, increase them all, and render still more rapid the already quick and irritable pulse. Here *opium*, or the acetate or hydrochlorate of *morphia*, or *hyoscyamus*, in large doses, must be resorted to. But these ought always to be conjoined with *camphor* and some of the *aromatics* or *spices*.— When *delirium* appears in the course of asthenic inflammation, depressing remedies are generally injurious; but the narcotics just named, and combined as now advised, will be of the greatest benefit, particularly in conjunction with the restorative treatment above recommended, and after the excretions have been duly evacuated by appropriate means.—(See art. DELIRIUM.)

245. *c.* When asthenic inflammations are attended by general *vital depression without re-action* (§ 62.), the most energetic stimulants, tonics, and restoratives are necessary; and if delirium supervene, camphor, ammonia and opium, with warm aromatics, should be freely exhibited.

246. *d.* When organic nervous or *vital power is depressed, although much general vascular excitement exists* (§ 63.), the pulse being rapid and weak, similar means to the above are requisite, but in less energetic doses. Camphor, with the narcotics already advised and aromatic spices, mild stomachic purgatives, occasionally aided by a draught and an enema containing turpentine and castor oils, are also most efficient remedies.

247. *e.* In cases characterised by *depressed vital power, acute nervous sensibility, and cerebral disorder* (§ 64.), the means just recommended are urgently called for; but the narcotics and camphor should be prescribed at an early period of the disease, and in large doses. The effusion of tepid or warm water on the head, according to the temperature of the part, may be employed. Medicated vapour or warm baths may also be tried, and medicated steam (§ 232.) may likewise be applied to the local malady.

248. *f.* When there are *excessive irritability, acute pain, and vascular excitement* (§ 65.), the internal and external treatment just prescribed, but modified according to the stage and particular features of the disease; a combination of camphor calomel, and opium; stomachic aperients, with the alkaline salts, and an occasional recourse to turpentine and castor oil, in the form of draught or enema; are chiefly to be relied upon.

249. *g.* Great *irritability of stomach* may occur at an earlier or later period of asthenic inflammations, when attended by any of the forms of constitutional commotion just referred to. When this is the case, every endeavour must be used to allay it. Warm aromatics, or spices and stimulants, with small doses of opium, will generally have this effect in the less urgent cases; par-

ticularly when aided by the assiduous application of the warm turpentine epithem over the region of the stomach, and by the administration of stimulant and antispasmodic enemata. In such circumstances, those articles which are most grateful to the stomach should be selected, and every thing of a depressing nature avoided. Effervescing medicines are seldom useful, especially if this very unfavourable symptom occur at an advanced period of the disease. More advantage will accrue from small and frequent doses of ammonia, camphor, capsicum, and other warm aromatics or stimulants, — from small quantities of burnt brandy, — from strong and highly spiced negus, — and from other restoratives of small bulk, — than from cold relaxing fluids. I have seen much benefit derived in these cases from moderate doses of créasote, or of cajuput oil, in suitable vehicles, or in the form of pills made with any absorbent substance.

250. *h.* When disorganisation of the inflamed part has commenced, or is advanced, *local means* of an energetic kind may be prescribed if they can reach the part in any way; if they cannot, the constitutional treatment, aided by suitable diet and regimen (§ 260.), and by a pure, dry air, must be energetically but carefully enforced. As to the topical applications which may be prescribed in these circumstances, some incidental observations have been already offered; but it may be further stated, that those substances which *constringe* or *impart tone* to the affected vessels and tissues should be employed, and that those which possess this as well as an *antiseptic property* in the most marked degree, should be preferred. Strong decoctions or infusions of cinchona, or oak barks, the terebinthinates, the solution of chlorinated soda, or of the chlorate of potash, or of the chloride of lime, or créasote, may be severally employed in the form of either lotion or injection, or on the surface of warm poultices, or in any other mode more appropriate to the peculiarities of the case.

251. *i.* During the treatment, especially of the advanced stages of asthenic phlegmasia, the *absorption of the morbid matter* from the seat of disease, into the circulating fluids, ought to be prevented by every possible means. This object can be obtained only by giving a free exit to whatever of this matter may have accumulated, and by preventing any collection of it from taking place. The internal treatment, which I have advised, will also have a most decided influence in preventing the absorption of it, and will enable the powers of life to resist whatever morbid impressions it may make in the seat of disease. The marked influences of all depressing agents in promoting the absorption of morbid fluids, and the powers of tonic and restorative means in preventing absorption, and the consequent contamination of the circulating fluids, as well as in enabling the constitution to resist the natural tendencies of these fluids and to throw them out of the œconomy, have been fully shown in the articles ABSORPTION (§ 15. *et seq.*), ABSCESS (§ 62.), BLOOD (§ 143. 157. *et seq.*), CELLULAR TISSUE (§ 35, 36.), and VEINS — *Inflammation of*. The constitutional and local treatment fully described when discussing *Typhoid* and *Putro-adynamic* FEVERS, *Diffusive Inflammation of the* CELLULAR TISSUE, and GANGRENE, is generally suitable to asthenic inflammations.

252. iii. TREATMENT OF INFLAMMATIONS INTERMEDIATE BETWEEN THE STHENIC AND ASTHENIC, &c. — Although inflammations generally present characters belonging more especially to the sthenic or asthenic forms, yet they occasionally present features appertaining to both, and consequently they require a somewhat different or modified treatment from what has been here assigned to each of the principal forms. Like all febrile diseases, inflammations also change their types and characters, under the influence of *climate, season,* and *epidemic constitution;* and hence, at particular periods, they not only present *sthenic* or *asthenic forms*, but also *transition*, or *intermediate, states.* Nor ought it to be forgotten, that these transition or intermediate states, as well as the more truly asthenic forms, are either so dependent upon, or associated with, certain conditions or affections of the constitution, — often of the organic nervous and circulating systems, — as to impart to the local malady many of its peculiar features. This is very manifestly shown in those inflammations which I have denominated *specific*, as arising from certain specific, or infectious, or poisonous causes, — in *erysipelas, puerperal inflammations, dysentery, small-pox, scarlatina, measles, syphilis,* &c.

253. *A.* Nor should it be overlooked, particularly in the treatment, that numerous morbid impressions made upon the œconomy, more especially by *epidemic constitution* and by *terrestrial exhalations,* modify remarkably all inflammations, and deflect them more or less from the sthenic type, to which I have sufficiently directed attention. These influences, therefore, however operating, must always be kept in view, in connection with other predisposing and exciting causes. The prevailing epidemic constitution is often sufficiently evident in its effects, however obscure in its origin and nature. The attentive observer will seldom fail of recognising it, even in its earlier appearances, particularly if the circumstances, to which I have already alluded (§ 191.), be observed.

254. *B.* The influence of *malaria* or of *terrestrial emanations* on inflammations is also important, although it is less observable in this country than in many others. In the southern countries of Europe, Asia, and America, and in many intertropical regions, malaria, by its effects upon the constitution, imparts to inflammation more or less of an asthenic or adynamic character, accelerating its course, or rendering its consequences most serious. In the less intense forms of inflammation, and particularly in their more chronic forms, the constitutional affection assumes either a *remittent* or *intermittent type.* In the former case, the influence of the paludal effluvia is often overlooked, or insufficiently estimated: in the latter, the local affection too frequently escapes detection, or is even never inquired after, the form of the attendant fever alone attracting notice.

255. *C.* In the *white races* of the species, and in the inhabitants especially of northern and temperate regions, the sthenic form of inflammation, and those states of the disease which more nearly approach it, most frequently occur. But in the *black* and *dark-skinned races,* inflammations either assume, or rapidly pass into, more or less asthenic forms. The mode of living is another circumstance which should be viewed in connection with the variety of species in which these diseases may occur, and which is of equal importance with it,

in the treatment of this class of maladies. Owing to the peculiarity of organisation possessed by the dark races, and to the forms which inflammations consequently assume in them, vascular depletions and other evacuations more readily exhaust the vital or constitutional powers, and are much less beneficial in the treatment of these diseases, than in the white races. Hence they should be most cautiously employed in these former varieties of the species, even although the phlegmasia may present, at its commencement, a predominance of the sthenic characters; and when it appears in an unequivocally asthenic form, means energetically tonic and restorative are especially requisite.

256. *D.* Much of this intolerance of depletions and lowering remedies, in the treatment of the inflammatory diseases of the dark races, may be attributed to their low or *abstemious diet*, and to their living chiefly on *farinaceous substances*. Although the constitution and modes of living of these races thus impart a certain character to many of their maladies, and especially to those under consideration, yet they also bestow upon them a much greater immunity from inflammations, than is possessed by the white and more highly fed variety of the species. Persons who live chiefly on animal food, and particularly on simply dressed or underdone meats, are much more liable to sthenic inflammations, and require much more copious depletions and alvine evacuations for their cure, than those who use vegetable food, or animal substances which have undergone great changes by elaborate or repeated cookery.

257. As these states of inflammation, which may be viewed as intermediate between positively sthenic and asthenic conditions, vary with these and other circumstances, so the treatment must necessarily be varied accordingly: but the several respects, in which variations should be made, cannot be stated with precision; they ought to be adopted conformably with the deductions, as to existing pathological conditions — local and constitutional — formed by the practitioner at the time of prescribing for them. Every thing must depend upon his pathological knowledge and acumen, and upon his practical resources, appropriately applied to each case.

258. *E.* The treatment of *specific inflammations* and associations of the phlegmasia with other maladies implicating the constitution or the principal viscera, especially those just named (§ 252.), requires no remark at this place. They present every intermediate feature between the sthenic and asthenic forms above described, according to the constitution and age of the patient, and to external or internal agents, existing epidemic constitution, and other circumstances by which his frame may have been, or is at the time, influenced; and they consequently require an application of the principles of practice, as well as appropriation of individual means, conformable thereto. But these topics will be found as fully discussed as the nature of the subject will permit, in the articles devoted to these *specific inflammations*, as well as in those on DYSENTERY, ERYSIPELAS, *the Complications of continued* FEVERS, &c.

259. iv. *The treatment applicable to* THE CONSEQUENCES *of the different forms of inflammation*, either has already been noticed in the foregoing observations, or has been fully considered in the separate articles devoted to the chief of these consequences, particularly ABSCESS, GANGRENE, INDURATION, SOFTENING, &c.

260. v. The DIET and REGIMEN ought to be strictly *antiphlogistic*, in the *sthenic forms* of phlegmasia. The *food* taken in the slighter and more chronic cases should be mild, farinaceous, and in small quantity. The *beverages* or *drink* ought also to be cooling and diluent (F. 588. *et seq.*). Perfect quietude of body and mind should be enforced, as tending most materially to keep down vascular action, to prevent the exhaustion of vital power, and to promote the operation of the medicines employed.

261. When inflammation assumes, or passes into, an *asthenic form*, it will be necessary to support the powers of life by a restorative diet and regimen, as well as by the medical treatment recommended (§ 236. *et seq.*). But in such cases, the digestive organs are always remarkably weak, are incapable of assimilating much food, and are readily disordered by whatever is difficult of digestion. The stomach should therefore be kept in humour, by allowing that only to be taken which is craved for or most relished. Generally, in the more asthenic cases, small quantities of warm or highly seasoned soups or broths, as beef-tea, gravy, or Mulligatawny soup, with boiled rice, &c., warm jellies, with old sherry, and similar articles, may be taken. If vital depression be great, warm and highly-spiced negus, or mulled wines, and even champagne, may be freely allowed. In many instances, when there is much thirst, brisk bottled stout, seltzer-water with wine or milk, spruce or ginger beer, &c., may be given, and may even be made the vehicle of warm restorative medicines; but they ought not to be given until their temperature is raised somewhat above that of the surrounding air, nor should they be taken in too large a quantity at one time. In this form of inflammation especially, the patient should respire a mild, dry, and pure air. The varying phases of the disease — local and constitutional — ought to be carefully observed throughout; and whatever may occur of an unfavourable character, instantly met by energetic means.

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INFLUENZA. — SYN. EPIDEMIC CATARRH. *Influenza* (Influence), *Rheuma Epidemicum*, Sauvages. *Catarrhus Epidemicus*, Swediaur, Good. *Febris Catarrhalis Epidemica*, Huxham. *Synochus Catarrhalis*, *Morbus Catarrhalis*, Ehrmann. *Catarrhus a Contagio*, Cullen. *Febris Remittens Catarrhalis*, Macbride. *Defluxio Catarrhalis*, Young. *Catarrhe Pulmonaire*, Pinel. *Fièvre Catarrhale Epidémique*, *Grippe*, Fr. *Die Russische Krankheit*, *R. Katarrh*, *Influenz*, *Blitzkatarrh*, *Epidemischer Schnupfenfieber*, Germ. *Snufsjuka*, Swed. *Catarrho Russo*, Ital.

CLASSIF. — 1. *Class*, Febrile Diseases; 5. *Order*, Fluxes (*Cullen*). 3. *Class*, Sanguineous Function; 2. *Order*, Inflammations (*Good*). III. CLASS, II. ORDER (*Author*, see *Preface*).

1. DEFIN. *Lassitude; pains in the head, loins, or limbs; chills, horripilations and coryza, followed by cough, by defluxions from the respiratory passages, by fever of a nervous or adynamic character and by anxiety at the præcordia, or pains about the margins of the ribs; the disease attacking a number of persons at the same time, and often passing into asthenic inflammation of the respiratory surfaces or organs.*

2. I. HISTORY.—*Influenza*, or *Epidemic Catarrhal Fever*, has been noticed by many medical writers since the revival of learning in Europe; and, although presenting on all occasions the same general features, yet it has assumed somewhat varied characters with the several circumstances connected with its appearances. The seasons, the weather preceding or during its visitations, the climate, and the locality, have, doubtless, slightly modified some of its phenomena; yet it has generally presented nearly similar features in very different seasons and situations. Indeed, whatever diversity may have existed in its several visitations, has been referrible rather to the epidemic itself than to other causes.

3. The earliest recorded occurrences of influenza were in the years 1239, in 1311, 1323, 1327, 1358, 1387, and 1403. VALESCO of Tarentum was a witness of that of 1387; and he remarks respecting it, that scarcely one tenth of the population escaped the disease, the aged chiefly dying of it, and rheumatic affections often following it. The most successful means of cure consisted of pectoral decoctions and sudorifics. It appeared again in 1411, 1414, 1427, and 1438. CARLI, the historian of Verona, describes this last to have been general throughout Italy, and fatal to the aged and to young children. MEZEREY, the French historian, notices the prevalence of influenza in France, in 1482. TORRELLA, in his history of Italy, states that an epidemic catarrh prevailed throughout Italy and Spain in 1505, "qui paucis pepercit, senibus maxime, cum raucedine, gravedine, molestâ tussi, destillationibusque per superiora, comitante febri."—The historian DE THOU mentions the appearance of a similar epidemic in 1510; and SENNERT remarks respecting it—"in omnes ferè mundi regiones debacchata, cum febre, summâ capitis gravitate, cordis pulmonumque angustiâ atque tussi; quanquam multò plures attigit quàm jugulavit." (*De Abd. Caus. Rer.* lib. ii. cap. 12.) A similar epidemic pervaded Europe in 1557, and is described by RIVERIUS, SCHENCK, and others. It presented the same symptoms as those observed in the recent visitations of the disease. MERCATUS (*De Int. Morb. Cur.* lib. i. c. 43.) observes, that the Spanish physicians were greatly perplexed as to the treatment of this epidemic, for bloodletting and purging were of no service, but even injurious in many cases; and VALLERIOLA (*Soc. Med. Comm. Append.* cap. ii.) states that it possessed the same characters in France — bleeding and purging being injurious, but demulcents and expectorants beneficial. The epidemic of 1578, described by BALLONIUS or BAILLOU, and which has been noticed by OZANAM and others as influenza, was evidently hooping-cough — inasmuch as it attacked children chiefly, and as the paroxysms of cough, which occurred at considerable intervals, were attended by vomiting of large quantities of a glairy fluid. That, however, which occurred two years later (in 1580), was certainly influenza. MERCATUS describes not only the catarrhal symptoms, but also the pains in the head, back, limbs, and about the false ribs, usually attending this disease. He observes that bloodletting was often fatal —"Quo profectò, factum fuit, ut plures interficerent imprudentes et imperiti medici quàm mali sævitia et inclementia." SENNERT (*Opera*, lib. iv. c. 17.) remarks of this epidemic, that, although generally prevalent in Europe, but few died of it, excepting those who were the subjects of old pectoral or visceral diseases, or who were improperly blooded. Similar observations are offered by WIER, ZACUTUS LUSITANUS, CAMPANA, RIVERIUS, &c., who state that this epidemic prevailed over the whole globe, and in Europe, chiefly in April and May. FORESTUS prescribed a small bloodletting at the commencement of the disease, but confined this practice to the young, strong, and plethoric.

4. The epidemics of 1596, 1597, and 1617 offer nothing worthy of remark. That of 1627 was altogether the same as the one just noticed. The influenza of 1658 is fully described by WILLIS, as he observed it in London, in April, May, and June. Many aged, infirm, and delicate persons were cut off by it; pulmonary congestions, bronchitis, and pneumonia having manifestly,

from his description, been complicated with it. He treated it by moderate bloodletting, in the young and robust, and by diaphoretics and pectoral medicines. The slighter cases recovered spontaneously after a copious perspiration. This disease appeared again in Continental Europe in 1663.—Bartholin, Sylvius de la Boe, and Ettmüller describe the epidemic of the summer of 1669 to have appeared after a severe spring, and variable weather at the beginning of summer. They employed chiefly sudorifics and pectoral medicines in its cure.

5. The epidemic catarrh of the autumn of 1675 was general throughout Europe. Rayger and Peu state that it appeared after a very rainy summer, and that it was preceded by thick mists and fogs, and inconstant weather. Puerperal females in many cases aborted, and others suffered menorrhagia. When the loss of blood was considerable, dropsy, debility, and prolonged convalescence ensued. This epidemic did not prevail in England until the following year. It is described by Sydenham and Ettmüller. The disease commenced with pains in the head, loins, and limbs, with great prostration of strength, cough, pains in the sides and points of the ribs, and occasionally bloody expectoration. Sydenham remarks that the pulmonary affections were merely symptoms of the epidemic aggravated by the cough, and sometimes by a too stimulating treatment and regimen. He viewed the disease as resulting from the action of a cold humid air upon the skin; the fluid secreted by this emunctory being thrown in upon the system, and exciting fever, cough, and disease of the lungs. He directed his treatment chiefly to the fever, and prescribed moderate bloodletting, diaphoretics, laxatives, diluents, and emollients. Large depletions were injurious; and evacuations prolonged the complaint in hypochondriacs and in hysterical females, and rendered the convalescence tedious. Of the less extensive epidemics of 1691, 1695, and 1699, it is unnecessary to take any notice; and those which appeared early in the eighteenth century need only to be slightly mentioned.

6. The influenza of 1729 and 1730 appeared after severe and changeable weather at the beginning of 1729; and traversed the whole of Europe during summer, autumn, and the commencement of winter. It varied in its general characters and complications in different countries, and at different seasons. It was frequently not ushered in by chills or rigors, but by lassitude, depression, headach, pains in the loins and limbs, oppression at the chest, anxiety or pain in the epigastrium, coryza, severe cough, sore-throat, and heat of skin, the pulse being quick and irregular. Swellings of the parotids, or of the tonsils, were not infrequent; and the pulse was often remarkably small and weak. In other cases, horripilations, vertigo, and rigors ushered in the disease, which sometimes assumed a severe character,—delirium frequently supervening. The most violent cases occurred in low, humid, close, or miasmatous localities, and were complicated with pneumonia, pleuro-pneumonia, or with bronchitis; and the fever, in these situations especially, presented somewhat of an adynamic or malignant character. When the complaint was simple, it often terminated from the fourth to the seventh day by epistaxis, or by a slight expectoration of blood, or by the hæmorrhoidal or menstrual flux. In the more complicated cases, congestions of the brain or lungs, and dropsy of the chest, frequently occurred; chronic bronchitis, consumptions, and various other diseases appearing as their sequelæ. It was most dangerous to the aged, and to those who had previous disorder of the respiratory organs. The treatment consisted chiefly of a moderate bloodletting at the commencement of the disease, in the young, strong, and plethoric, in pregnant females, and in the complications with congestion of the brain, or with inflammation of the lungs or pleura; of diaphoretics, diluents, and diuretics; and of mild purgatives followed by anodynes, demulcents, and emollients. (Hoffmann, Beccaria, Morgagni, &c.)

7. The catarrhal epidemic of 1733 appeared in some countries as early as the preceding December, and in some places assumed a more inflammatory character than in others. The head was frequently affected, and hæmorrhages from the respiratory surfaces sometimes occurred. Children and young persons were more frequently attacked than in the influenza of 1729; but the aged, and those already the subjects of visceral disorder, were most severely and dangerously seized. The plethoric and sanguine often presented inflammations of the throat and lungs; and the bilious experienced severe pains in different parts. The intemperate suffered greatly from gastric disorder. Dropsy of the chest often supervened at an advanced stage, or as a sequela of the disease. Bloodletting was injurious, unless in the complications with pneumonia, or pleuro-pneumonia; and even in these it often proved hurtful, when carried too far, or exclusively trusted to. Emetics, mild purgatives, diaphoretics, and demulcents, with diuretics, and afterwards tonics and antispasmodics, were found most generally useful. The same epidemic, as it occurred in the South of England, was described by Huxham, who notices the disposition to perspiration, which appeared about the second or third day and abated the fever, proving a crisis to it about the fourth in the milder cases. He found emetics of great benefit, when there was nausea or biliary disorder. After bleeding, in the pulmonary complications, he prescribed expectorants. His treatment, in other respects, was similar to that already mentioned.

8. Huxham has described the influenza of 1737 to have commenced with chills, headach, coryza, repeated sneezing, and pains in the face, loins, or limbs. Copious defluxions from the nostrils and respiratory passages, severe cough, difficult expectoration, oppression at the præcordia, &c., generally followed. Sore-throats, swellings of the parotids or submaxillary glands, severe pains in various parts, and sciatica were often also complained of—the symptoms varying much with individual constitution, &c.—Many experienced only slight febrile disturbance, which terminated in a moderate sweat; and in others the disease passed into a dangerous peripneumony; and the severer cases were generally followed by great prostration of strength, by consumption, pains in the limbs, or obstinate rheumatism. The treatment was nearly the same as that employed by him in the preceding epidemic; but he found that bloodletting could be carried somewhat further than in it, particularly in the complicated cases. Blisters, diaphoretics, and expectorants were generally pre-

scribed. For the removal of the rheumatism which followed this disease, he employed calomel with purgatives and antimonials.

9. The catarrhal fever of 1742 followed a most severe winter; north-east winds having prevailed for nearly five months. Its characters, were in no respects different from most of the epidemics already noticed. The most severe cases presented signs of adynamia, or even of malignancy, particularly in the aged, debilitated, cachectic, or previously diseased. In the simple form of the distemper, bloodletting and evacuations were injurious; and diaphoretics, expectorants, and diuretics were beneficial, in this and in other forms. But, when the respiratory organs became inflamed, vascular depletion, cautiously employed, was requisite, particularly early in the disease. In this epidemic, paregorics, oxymel of squills, and a gentle emetic at the commencement of the complaint, or immediately after the bleeding, when this was required, were generally employed by Huxham, Sauvages, and others.

10. The epidemic of 1762 pervaded nearly the whole of Europe, between the months of February and July. Descriptions of it have been left by De Maertens, Baker, Gilchrist, Watson, and others. It proved very fatal to the aged, the asthmatic, and previously diseased; and pregnant females often suffered abortion or premature labour when attacked by it. Gilchrist, with much justice, viewed this, as well as other epidemics of the same kind, as a fever, *sui generis*, attended by catarrhal symptoms. The course, complications, consequences, and treatment of this influenza differed in nothing from those which preceded and followed it.

11. The catarrhal epidemic of 1775 pervaded Europe, and, like several visitations of the same kind, was not confined to the human species, but affected also the lower animals—often commencing with them. It broke out during a dry and warm summer, following a mild and very dry spring. This was the first epidemic that received the name of *influenza*, it having been generally imputed in Italy to a peculiar aërial influence. It commenced with reiterated chills, lassitude, coryza, sneezings, headach, and wandering pains in the chest, loins, and limbs, followed by fever with incessant cough, copious defluxion, sore-throat, hot skin, a quick soft pulse, pale turbid urine, and vertigo or slight delirium. About the third or fourth day, copious perspiration, hypostatic urine, and free bilious evacuations often took place, and proved critical. It required the same treatment as other preceding epidemics; and when neglected, often passed into asthma, chronic bronchitis, and consumption.

12. Of the epidemic catarrhs, which have occurred from 1775 to 1833 — namely, in 1782, 1789, and 1803 — I shall notice only that of 1782. It appeared in Great Britain between the end of April and the middle of June, and attacked about four fifths of the population. It was least prevalent and mildest in children. It was most severe in the aged, the asthmatic, and the previously debilitated or diseased; and, except these, but few died of it. Like other epidemics of this kind, it seldom continued longer than six weeks in a place. The treatment was similar to that adopted on former occasions. Bleeding was required only when symptoms of pleuritis or pneumonia appeared. Gentle emetics and mild purgatives were useful early in the disease—the former chiefly when the expectoration was difficult. When the expectoration was too profuse, bark or other tonics were required. Where the cough continued long and obstinate, opiates and change of air were most serviceable.

13. From the foregoing brief epitome of some of the most remarkable epidemic catarrhal fevers upon record, it will be observed, that they have been all essentially the same in character, and that they required the same principles of treatment. Certain differences, however, existed, not only in those of which I have made mention, but also in most of those to which I have thought it unnecessary to refer. In some, an inflammatory diathesis seemed more apparent than in others; but when inflammatory complications occurred, they always presented more or less of the asthenic diathesis; or the accompanying, and indeed the primary, fever presented more of a nervous or adynamic, than of an inflammatory form. The constitutional disturbance generally preceded the inflammatory complications; such complications arising out of predisposition, of previous disorder, or of accessary causes. In some epidemics, children and young persons were more affected than in others: but in all, the aged, the asthmatic, the debilitated, and those subject to disorders of the respiratory organs were most seriously attacked. Although the disease was most prevalent between the ages of fifteen and fifty, as in most other epidemic fevers, yet it was least dangerous or fatal at this period. Some of the epidemics differed from others in the presence or severity of the pains in the head, chest, back, or limbs. In some, particularly, the pains assumed the form of a rheumatic complication, which continued after the febrile and catarrhal symptoms had been removed; in others, they seemed to depend upon biliary colluvies, or collections of morbid bile in the biliary apparatus. In some, also, the complication was very generally bronchitis, or pneumonia, or pleuro-pneumonia — whilst in many, sore-throat, with or without swelling of the adjoining glands, or gastric disorder, was more or less evident. Lastly, some epidemics, although almost universal, were comparatively mild; and others were both severe and fatal; the fatality proceeding chiefly from the severity, or extent of the complications, and from previous disease.

14. The *sequelæ* of the several epidemic catarrhal fevers, of which any satisfactory accounts have been left to us, were nearly the same as observed in recent times. These consisted chiefly of chronic bronchitis; of pulmonary consumption; of hæmoptysis; of serous effusion in the thoracic cavities, consequent upon congestions of the lungs, or of asthenic inflammation of the serous surfaces in this cavity; of rheumatic and neuralgic affections in various parts; and of functional disorder of the digestive and assimilating organs.—In some of the epidemics, and in that of 1837, sciatica was a not infrequent remote sequela of the disease. The *treatment* which was found most appropriate in former epidemics will be further referred to hereafter.

15. II. Symptoms of Influenza.—The account which I shall give of influenza is derived from an extensive observation of its pathology and treatment during the epidemics of 1833 and 1837

—the two most severe visitations of the disease in this country upon record, and especially in London. In both these the distemper was either *simple* or *complicated.*—*A. The simple form* of influenza, was most frequent in the young and middle-aged, and the previously healthy; and usually commenced with chilliness, rigors or horripilations, lassitude, general depression or anxiety, gravedo and headach, followed in some hours by heat of skin, coryza, sneezing, fulness and tenderness of the eyes, soreness of the throat, hoarseness, cough, pain of the back and limbs, loss of sleep, and considerable fever. The cough was generally attended by more or less soreness of the chest, hurried respiration, slight dyspnœa, either pain or a tenderness and bruised sensation at the diaphragmatic margins of the ribs and epigastrium, and wandering pains in the trunk, especially about the sides. Nausea, loss of appetite, sometimes vomiting, costiveness, seldom diarrhœa, and a white, slightly coated, or mucous appearance of the tongue, were also present. These symptoms continued for 24, 36, or 48 hours; the cough being dry, and aggravating the sense of soreness, and the pains about the chest. Afterwards expectoration became more abundant and easy; the skin softer and moister; and the pain of the head or about the frontal sinuses, and in the chest, back, or limbs, less severe. The pulse was generally quick, sometimes a little sharp, usually soft and weak: but it was often irregular, or very changeable and uncertain. As the symptoms became mitigated, about the third, fourth, or fifth day, the perspiration became more abundant, and the urine deposited a copious sediment: yet the cough frequently continued severe and obstinate, and the consequent debility was much greater and more prolonged than the severity or duration of the disease seemed to warrant. In the more severe cases, these symptoms were generally very prominent, and the febrile phenomena fully developed, transient delirium even occurring; but in the slighter cases, several of them were not very remarkable. In this form of the disease, the chest sounded clear upon percussion, and respiration was clear and vesicular, no morbid râle being heard on auscultation; but, as the complaint proceeded, a slight mucous râle was sometimes present.

16. *B.* The COMPLICATIONS, or prominent affections of influenza, were chiefly—(*a*) a peculiar inflammatory condition of the throat and pharynx; (*b*) severe gastric disorder;—(*c*) bronchitis;—(*d*) a specific pneumonia, or pleuro-pneumonia;—(*e*) tubercular phthisis;—(*f*) a form of pleuritis;—(*g*) rheumatism;—(*h*) disease of the heart and pericardium;—and, (*i*) severe adynamic or nervous fever. The frequency of the occurrence of these affections in a predominant form was nearly in the order in which I have enumerated them.—*a.* The *inflammatory state of the throat and pharynx* was very frequent, but sometimes slight. It was always of what has been usually termed an erythematic or erysipelatous kind, but more correctly asthenic or spreading; and attended, as it proceeded, by more or less of a fluid discharge, which served to increase the quantity of matter thrown off at each fit of cough. In the severer cases, this state of inflammatory irritation was accompanied with some swelling; and in many cases, the affections of the bronchi, and of the upper portion of the digestive mucous surface, seemed only the extension of the disorder of the throat and pharynx to these parts. This affection of the throat generally subsided in two or three, or at most five or six, days, after a more or less copious discharge from the affected surface, and sometimes after the extension of disease to the gastric or bronchial surfaces—or rather, after the disorder of the latter had become more manifest.

17. *b. Severe gastric disorder* was indicated by soreness and tenderness at the epigastrium and under the lower end of the sternum, and by nausea and vomiting, sometimes with thirst. It was often very early observed; and when it and the preceding affection were present in the same case,—which was not infrequent,—it was difficult to determine which had been the first to appear, or whether they were coetaneous in origin. Indeed, they seemed often to have been prominent local manifestations of the constitutional disease, arising nearly at the same time. Although rendering the disease more or less severe, increasing the debility and general depression, and prolonging convalescence, the gastric complication was never fatal, or even dangerous. It was sometimes associated with considerable derangement of the biliary functions and secretion, with slight costiveness, and in some cases with diarrhœa; the irritation in these latter having seemed to extend along the digestive mucous surface.

18. *c. Bronchitis* was one of the most frequent and severe complications observed in the last two epidemics, especially in that of 1837. But it was different from the acute sthenic bronchitis usually observed as a primary disease, or as occurring in previously healthy persons. It was attended in many cases with more marked vital depression, with a more copious expectoration of a greyish, viscid, ropy, and less frothy mucus, which often quickly passed into a thin muco-puriform matter, than in idiopathic bronchitis. In most of the cases, both lungs were more or less affected, and the disease seemed rapidly to extend along the larger bronchi to the smaller ramifications, until, in the dangerous or fatal cases, the air-cells themselves became implicated. At the commencement of the bronchial complication, the cough was hard, dry, and severe; but expectoration soon became abundant,—the wheezing from the accumulation of the morbid secretion in the bronchi being often remarkably loud. The cough and the quantity of the sputa were generally increased at night, the former being frequently so severe, and the attendant dyspnœa so urgent, as to prevent the patient from lying down. When both lungs were gravely affected, the patient was obliged to sit or be shored up by pillows. In some cases, the sputa were remarkably abundant, consisting of a very fluid muco-puriform matter, almost from the commencement. In most of the bronchial complications, the *dyspnœa* was considerable, and especially when expectoration was difficult and the sputa copious; still it was often great when the discharge from the respiratory passages was neither abundant nor difficult. The rapid extension of this asthenic form of bronchitis throughout the lungs was most remarkable in the delicate, the aged, the cachectic, and those subject to asthmatic or bronchial disorder. In some instances it quickly superinduced a nervous or asthenic form of pneumonia or pleuro-pneumonia, with which it

further became associated; and occasionally it seemed to have given rise to more or less emphysema of the lungs. The mucous, or the crepito-mucous, rhonchus was generally heard in most of these cases. The pulse was usually upwards of 100, often above 110, and irregular. The severer forms of this complication often terminated fatally, owing to the quantity of the morbid secretion filling the smaller bronchial ramifications, infiltrating the air-cells or even the areolæ of the connecting cellular tissue, and thus occasioning asphyxia.

19. *d.* The *pneumonia*, or pleuro-pneumonia, with which influenza was often associated, was generally of a nervous or an asthenic form. It was either an early complication, or was consequent upon the bronchitic affection. It was indicated by oppression, weight, and anxiety in the chest; by difficult or anxious, breathing; by a crepitous, or crepito-mucous, rhonchus in the vicinity of parts where neither the respiratory murmur nor any morbid sound was heard, and where more or less dulness existed on percussion. The sputa were muco-puriform, distinct, copious, and but rarely bloody or rusty. This complication was always severe, was often further associated with bronchitis, and, in these cases, the patient could not lie on either side, but required to be propped up in bed. The changes observed in the lungs after death were different from those usually consequent upon idiopathic pneumonia (§ 32, 33.).

20. *e. Tubercular phthisis* was generally aggravated by the influenza; and was not infrequently called into existence by it, where the predisposition already existed, or where the tubercles were in a latent or crude state. In some instances, the subsequent stages of consumption were accelerated by it; but few cases terminated fatally during the epidemic seizure, unless at a far advanced stage of the tubercular formations, and then evidence of extensive bronchial disease was generally furnished both during the attack, and upon examination after death. Yet I met with instances of persons in far advanced phthisis, who either experienced comparatively slight attacks of influenza, or had not their malady greatly aggravated, or its course materially accelerated, by the epidemic.— Much of this seemed owing to the treatment pursued in these cases.—The complication of influenza with phthisis was not, in my practice, more frequently attended by *hæmoptysis*, than it is in other circumstances; although hæmoptysis was frequent in phthisis, subsequent to, or developed by, the epidemic malady.

21. *f. Pleuritis* was not a frequent complication, unless connected with pneumonia; but when it occurred, its characters were much modified by the primary epidemic distemper. It generally appeared insidiously, the pains attending it having been often mistaken for the pains of the chest and vicinity usually attending the severe cases of the epidemic; and the latter having often masked the former. In some instances, effusion from the affected surface had proceeded far, before the existence of inflammation was suspected; the matter effused, instead of having consisted more or less of fibrinous or coagulable lymph, as in the sthenic forms of phlegmasia, having generally been fluid, turbid, sero-albuminous, or sero-puriform, and abundant. Hence adhesions of the opposite surfaces were never produced by the pleuritis complicating influenza, although old adhesions were frequently found upon dissection of fatal cases. In rare instances, not only pleuritis, but also pericarditis of a similar character, co-existed with influenza.

22. *g. Rheumatic affections* were seldom observed, even in those subject to them, during the epidemic malady; but they more frequently occurred subsequently, as sequelæ. The wandering, and sometimes severe, pains, characterising influenza, could not be viewed in the light of a rheumatic complication. When rheumatism appeared, it was generally obstinate, and, unless very appropriately and energetically treated, aggravated and prolonged the disease, and protracted convalescence.

23. *h. The complication with disease of the heart or pericardium* was observed chiefly in persons who were previously the subjects of such disease. A form, however, of asthenic pericarditis was met with in rare instances, either alone, or in conjunction with pleuro-pneumonia or pleuritis. But, in such cases, the inflammation gave rise to a similar effusion to that observed in the associated pleuritis already noticed (§ 21.).

24. *i.* In some cases, influenza assumed so severe a character, as nearly to approach *low nervous* or *adynamic fever*, owing to the great depression of organic nervous power, and the delirium and other cerebral symptoms attending it. Yet the disease was very different from these states of fever; and chiefly as regarded the catarrhal or bronchial symptoms, the sharpness or acuteness of the attack at the commencement, the free and general perspirations early in its course, the less loaded and more moist states of the tongue, the pale and turbid condition of the urine, the less complete loss of muscular power, and the much shorter duration of the febrile phenomena, when appropriately treated, in the former malady.

25. *k.* Some other complications were observed, particularly *laryngeal*, *croupy*, or *tracheal irritation*, of various grades of severity, but generally of a similar character to the bronchial affection already noticed (§ 18.), with which these were usually associated. They were seldom, however, met with, as the only, or even as the most prominent, complication. In slight forms, causing, at first, more or less hoarseness, and a harsh, clanging, and dry cough, and, subsequently, a convulsive or strangulating cough, with difficult expectoration and viscid sputa, these affections were very common; and were often either a part, or the commencement, of the phlegmasia which extended from the throat to the bronchial ramifications,—the larynx and trachea presenting, in fatal cases, similar appearances to those seen in the bronchi and pharynx.

26. These were the chief local affections which complicated the last two epidemic catarrhal fevers, and rendered them severe and often fatal. Some of them, it will be seen, were antecedent disorders, not only rendering more violent the epidemic attack, but themselves becoming, in turn, more developed and aggravated by the constitutional disease. Others, again, were evidently called into existence by the epidemic malady, owing to latent predisposition, or to various concurring or accessory causes. Very generally, however, influenza did not supervene upon acute visceral or febrile disease, until the latter was subdued, or

the patient was convalescent. Thus, I saw several patients with bronchitis, pneumonia, &c., near the end of December, 1836, just before influenza had appeared; and, although the epidemic prevailed in the same family during the acme and subsidence of these diseases, it did not attack these persons, until convalescence had either commenced, or had made considerable progress. It was generally severe in such cases,—the constitutional and local affections presenting an asthenic character; but recovery took place in all.

27. *C. Exacerbations* or *relapses* of the disease were sometimes observed after premature exposures and errors of diet; but the relapses were not always more severe than the primary affection; and so rarely occurred, if once the patient was truly convalescent, that they were rather exacerbations, or prolongations, of the disease, in consequence of a superinduced complication, or the production of renewed bronchial irritation. Many of the affections, which were viewed as relapses, were cases of bronchitis or of tracheal irritation, caused by cold during convalescence, and increased or modified by existing disorder of the digestive canal and of the biliary organs, and by debility.

28. *D. Certain of the symptoms* require a brief notice.—The *tongue* was not materially affected in many: in some, it was white; in others, it was covered by a soft, or creamlike, or yellowish, mucus or fur. The *fauces, pharynx,* and tonsils were generally red. There was always loss of *appetite,* and generally *nausea* or *vomiting* at the commencement; in some, bile was thrown up. *Thirst* was not complained of in the majority of cases. The *urine* was usually thick or turbid, somewhat red, and deposited a pink sediment as the attack subsided. *Cough* was always present from the first day, and was often very severe for two or three days; but it was often prolonged, sometimes after the subsidence of the attack, and assumed a convulsive form. There was often *dyspnœa,* with more or less wheezing and restlessness; but chiefly in the complicated cases, or in asthmatic persons. The *expectoration* was chiefly mucous, and as already described, unless in the bronchitic or pulmonic complications, or in those subject to chronic catarrh or bronchitis; and in these it was muco-puriform. No morbid *rhonchus* or *râle* was heard in most of the simple cases, although the cough and dyspnœa were severe. The *pulse* was more or less accelerated, generally soft, weak, and occasionally small, especially as the disease advanced; but it was often irregular—being at one time sharp, hard, or wiry, for a short period, and then becoming soft and weak. The sharpness or fullness of the pulse sometimes led to bloodletting, which was seldom of service, even when the disease was associated with inflammation, unless prescribed in great moderation, and at a very early stage. In London, however, bloodletting was rarely indicated by the symptoms; the phlegmasia often complicating the disease, being decidedly asthenic, and more frequently aggravated than ameliorated by vascular depletions. The *blood* was sometimes buffed in the complicated cases; the buff being deep and gelatinous, but seldom cupped or tenacious. Much mental and physical depression *existed;* and the character of the *febrile* or *constitutional affection* was decidedly *nervous* from the commencement, vascular action being more or less asthenic or adynamic throughout. But the febrile symptoms varied much, not only at different periods, but also at the same stage, according to the constitution, previous health, and age of the patient, and to the severity and complication of the disease.

29. *E. The sequelæ of influenza* were sometimes more dangerous than the primary malady; and the severity or danger of these had frequently no relation to the violence of the epidemic seizure; for the consequent affections were often most serious in persons who had experienced a comparatively mild attack of influenza, and as frequently slight in those who were severely attacked. —*a. Tubercular consumption* was observed chiefly in those who had an hereditary tendency to the disease, and in whom tubercles had evidently existed in a latent, undeveloped, or crude state—the influenza having promoted their evolution.—*b. Chronic bronchitis* also not infrequently occurred; either the bronchial complication having degenerated into a chronic and asthenic form, or this form having appeared during convalescence from the influenza, owing to the predisposition left by it. In either case, the disease was obstinate, and required a restorative treatment and regimen, with change of air.—*c. Asthmatic affections,* often presenting a nervous, convulsive, or spasmodic character, in conjunction with bronchial congestion or irritation, and sometimes with considerable bronchial discharge, were occasionally met with in persons advanced in life. In these, the cough, dyspnœa, and wheezing were more or less distressing; and complete or even partial relief was afforded with difficulty.—*d. Disease of the heart* was sometimes a sequela of influenza; but it might have existed previously, although it did not become so fully developed as to attract attention, until subsequently to the epidemic attack. Indeed, a more or less asthenic *endocarditis* or *pericarditis* may have occurred as a complication of influenza at some period of its course—this latter rendering the former still more obscure, until the more advanced consequences of the complication, and the subsidence of the primary malady, rendered the nature of the lesions more manifest. However induced, there can be no doubt that lesions of the heart of various kinds, and such as usually result from inflammatory irritation, were often met with in those who had experienced severe seizures of the epidemic. In some, the disease of the heart was associated with asthma or with more constant dyspnœa, and seemed aggravated by the debility consequent upon the influenza, especially in chronic cases, and where the heart-affection was not decidedly inflammatory.—*d. Hæmorrhage* from the respiratory organs was occasionally met with in those labouring under phthisis; but it may also have arisen from congestion of the lungs and interrupted circulation through the heart.—*e. Dropsies,* especially of the *thoracic cavities,* were sometimes observed as consequences, more or less remote, of severe attacks of influenza, particularly where the lungs had been implicated, or where disease of the heart existed previously, or where asthenic pericarditis had existed as a complication. But still dropsy was not so frequent a sequela of this as of some other epidemics.—*f. Obstinate dyspepsia,* and other *functional disorders* of the *digestive organs,* were very common sequelæ of this malady; and generally required change of

air, with strict attention to diet, for their permanent removal. — *g. Rheumatism* was a not infrequent consequence of the epidemic, and, as far as my experience enabled me to judge, was most benefited by a restorative and tonic treatment, with antacids, sometimes with colchicum, and change to a dry pure air.

30. III. PROGRESS AND DURATION. — The disease generally presented an acute stage, lasting from three to five days, and, in the slighter cases, terminating either then, or in two or three days. But it more frequently, especially in the severer seizures, continued, in a less acute form, for a period varying from five to fifteen days longer. — The course and duration of the complicated cases were very indefinite; and the recovery from these, as well as from all the most severe attacks, was attended with great debility, which often continued for a long time, even although none of the *sequelæ* or consequences just mentioned were manifested.

31. IV. DIAGNOSIS. — *Influenza* may readily be confounded with *acute bronchitis*, and with common or *sporadic catarrhal fever*, but may easily be distinguished from them, by attention to the following circumstances: — Influenza commences with very manifest disorder of the organic nervous system, as in all other idiopathic fevers, or epidemic maladies; and, although a predominant affection of the respiratory passages soon takes place, yet the digestive organs and circulating system are also more or less deranged. The dyspnœa attending influenza is much greater, relatively to the other indications of disorder in the lungs, particularly those furnished by the aid of the stethoscope, than in the complaints just mentioned. The pains complained of in the head, loins, limbs, and about the insertion and edges of the diaphragm; the severity of the cough in the night, and the general insomnia; the physical depression, and the weakness and irregularity of the pulse; the epidemic prevalence of the disease; and the different effects of medicine in it, and in those disorders; further serve to distinguish between them. — Influenza differs also from the *catarrhal fevers* of spring and autumn, in the great debility, in the spasmodic pains and disturbance of sensation generally, in the nausea and vomiting, in the disposition to sweating, and the occasional appearance of an exantheme, and in the peculiar expression of the face, which attend it; in its almost universal prevalence, and in the danger to the aged.

32. V. APPEARANCES IN FATAL CASES. — The changes observed after death were referrible — 1st, to pre-existent disease; and, 2d, to the effects of the epidemic and of its complications: to these latter only attention need be directed. The *trachea* and *bronchi* contained more or less of a frothy, muco-puriform, and frequently sanguinolent, matter, which was most abundant in the smaller bronchi. The *mucous membrane* lining these parts was generally of a dull red, or of a livid or dark hue, from congestion of the small vessels, and softened and thickened. These appearances were sometimes confined to one lung, but they more generally extended to both. The *substance of the lungs* was often darker than natural, and of a livid or violet colour. The air-cells, and frequently the tissue of the organ, seemed partially infiltrated by a muco-puriform, or muco-sanguinolent, fluid, which rendered it denser, and less crepitant on pressure, than usual; and its vital cohesion was much weakened. In aged, asthmatic persons, the lungs were generally very dark-coloured, much softened, infiltrated with fluid, partially emphysematous, and otherwise changed; a dirty or turbid serum being sometimes effused into the cavities of the thorax. The *pleura* was occasionally partly or very extensively adherent; but the adhesions were always the consequences of old disease. The *blood* in the heart and large vessels was generally dark and fluid.

33. In the younger and more robust subjects, where the indications of associated pneumonia were the most manifest, the lungs were also of a dark hue, congested, infiltrated with a dark or sanguinolent fluid, much denser than natural, or splenified, no longer crepitant, but not truly hepatised, as in true or sthenic inflammation; for the matter thus filling the areolar tissue of the organ was not a coagulated or fibrinous lymph, but an uncoagulable fluid, which could be more or less completely squeezed out of the part. The substance of the lungs was also torn with greater ease than usual, and the bronchial mucous membrane and bronchi presented the appearances already described (§ 32.). Both lungs were thus diseased, in many cases; and, even when one lung only was affected, the inflammation was more or less diffused, as in other instances of asthenic phlegmasia. In some, the most depending portions of the lungs were most infiltrated and congested — showing that the changes had partly taken place at the time of, or subsequent to, dissolution. — Appearances of asthenic inflammation were, in a few cases, observed in the *heart* and *pericardium*, with the effusion of a dirty serum into the latter; and, as Dr. CLENDINNING has remarked, in his excellent paper on the disease, these lesions were generally associated with those produced by pneumonia and pleuritis. Old disease of the heart was met with in many aged persons; and, in those who had been labouring under tubercular consumption, the bronchial mucous membrane, and tissue of the lungs between the tubercular formations, presented very similar changes to those described. The *digestive mucous surface*, particularly of the pharynx, œsophagus, and stomach, was congested, and sometimes presented patches or streaks of a dark red, or livid hue. — I never saw the exudation of lymph or coagulable albumen in the small bronchi, resembling the false membrane of croup, which Dr. GLUGE says he met with, nor is it mentioned by any other writer. My own dissections were few; but I have adduced also the results obtained by Drs. CLENDINNING, MACLEOD, GRAVES, and others.

34. VI. CAUSES. — The seasons, and the state of the weather both antecedently and at the time of the outbreak of influenza, have had no share in its production. Whether appearing in spring, summer, autumn, or winter; or occurring in mild and dry, or in cold and moist weather; or prevailing in cold, temperate, or warm countries; it has presented the same general features: and, even in seasons and climates most likely to have rendered it more than commonly mild, it has sometimes assumed a severe form; whilst it has presented a milder character in countries where it might have been expected to have been a more formidable disease. No dependence, therefore, can be placed upon climate, season, and weather,

in modifying its severity or complications, although they doubtless have had more or less influence in this respect on some occasions.

35. This epidemic has not arisen from the prevalence of easterly, northerly, or other winds; for, not only have winds from such quarters prevailed without influenza having occurred, but it has broken out in different places during the prevalence of winds from different quarters. That it has not proceeded from cold in any form or way, is proved by the circumstance of persons who took the greatest care of themselves, as respects clothing and exposure, having been attacked as well as those who were constantly subjected to the vicissitudes of season and weather. Yet, in some instances, as Dr. GRAVES has remarked, exposure to cold determined the immediate access of the disease, or increased its violence when present; and I would add, gave rise to several of its complications. No kind of occupation seemed to protect from its visitation; nor did the impregnation of the air with gaseous fluids, usually considered disinfectant, have this effect. It is probable, from the very rapid progress of the complaint over nearly the whole globe, that it depended, either, as Dr. GRAVES suggests, "upon telluric influence — upon some agency connected with variations in the physical conditions which operate on the external surface of our planet;" or upon a very general change in the usual conditions of the electricity circulating on the surface of the earth: but these, in the present state of our knowledge, are merely conjectures.

36. As to the influence of *infection*, in causing and propagating influenza, some diversity of opinion exists: but the question admits of a tolerably easy solution. That the disease neither originated in, nor was diffused by, *contagion*, direct or mediate, seems satisfactorily proved, by the nature of the disorder, and by the phenomena and circumstances connected with its appearance and spread. No facts have been adduced of a contagious property, according to the meaning I have attached to the term (see art. INFECTION, § 1—3.), having belonged to it; whilst numerous circumstances, showing that it was devoid of such property, have been observed by all who were practically acquainted with it. The almost simultaneous outbreak of the epidemic in distant countries; the rapidity with which it traversed immense spaces; the fact of its often pursuing, in its spread, a different course from that of human intercourse; the great numbers attacked at the same time, when it appeared in a town or district; and the frequent suddenness of the seizure; showed that it proceeded chiefly from a very generally diffused change in the atmosphere, that modified or infected the system in a determinate manner. That this malady depended principally upon atmospheric influence, these and other considerations fully prove; but that, in some instances, other agents or causes concurred with, or aided this, the principal cause, may be admitted. These other concurring or aiding causes seem to have been the ordinary exciting causes of catarrh, and infection proceeding directly from those labouring under the malady. It was often observed that communincation with those already attacked appeared to favour the developement of the complaint in the healthy; for, when an individual came with the disease from a distance, the inhabitants of the house in which he arrived were usually the first attacked. But it must be conceded, that this infection was a very subordinate cause to that, upon which the epidemic principally depended; and that it was merely a concurrent and contingent circumstance in the diffusion of the complaint.

37. The disease was not very materially influenced in its spread by *age*. It was, however, most prevalent in persons of from 16 to 60; and, upon the whole, the least prevalent and most mild in children, although severe and complicated seizures were not uncommon even in them. It was very frequent, most complicated, and severe in the aged—from 60 upwards. *Sex* and *temperament* did not appear to have influenced the liability to an attack. It did not appear that a former seizure caused exemption from it afterwards. The Author attended several persons in the epidemic of January, 1837, who had been attacked, as well as others who had not been attacked, by that of 1833; but he also saw some who had the influenza of 1833, and who escaped that of 1837. He is acquainted with very few instances of entire exemption from both these epidemics. He and his family escaped on both occasions. Generally, when one in a family was seized, the majority of its members were soon afterwards affected; but often two or three were attacked so nearly at the same time that it was difficult to assign the priority to any one. The epidemic continued about six or seven weeks in a place; but a few cases occurred just before, and others not until a short time after, its general prevalence. A circumstance of some importance, although very frequently overlooked, in respect not only of the two latest, but also of former epidemics of this kind, has been observed, and recorded by several writers; namely, the appearance of the complaint, also as an epidemic, among many of the lower animals, particularly horses and dogs, for some weeks or months before the outbreak of it in the human species.

38. VII. NATURE.—It was evident, from an attentive consideration of its phenomena, that influenza partook largely of the characters of an epidemic fever. It was also manifest that the exciting cause of the complaint, whatever may have been the nature of that cause, existed in the air, and that, by this medium, it morbidly impressed the organic nervous influence, especially in the respiratory organs, where its first invasion took place in the process of respiration; these organs thus becoming and continuing prominently disordered. This primary and especial affection of the organic nervous influence was shown by all the premonitory and early symptoms. That this affection was not only peculiar or specific, but was further characterised by depression — that the organic nervous energy was remarkably weakened as well as otherwise changed—was evinced by the lassitude and debility which were present from the commencement of the seizure; by the affection of the digestive and circulating organs; by the spasmodic and nervous pains in the trunk and limbs; by the states of vascular action and of the blood; and by the general debility produced by the complaint. The circumstances of the pains not having been aggravated by pressure, of their wandering and diffused character, and of the spasmodic nature of the cough, were proofs that the disease was not essentially inflammatory, although

inflammation of a more or less asthenic form sometimes supervened. This position was further strengthened by the state of the circulating organs and fluids, and by the appearances observed in fatal cases. That fever, or rather increased temperature of the surface of the body, was not remarked in some cases, and in some even of the most dangerous complications of the disease, did not militate against the opinion of influenza being an epidemic fever *sui generis*, with early and prominent disorder of the respiratory passages and organs.

39. VIII. TREATMENT.—The *milder* and *simpler states* of influenza required little more than the early restoration of the cutaneous exhalation by diaphoretics, and the evacuation of disordered secretions by mild chologogue purgatives. In the majority of cases, five grains of blue pill and six of compound extract of colocynth, with one of ipecacuanha, given at bed-time, and a mild aperient the following morning if these did not act freely, were extremely useful; but, if there were nausea or retchings, seemingly proceeding from biliary disorder, a mild *emetic*, or the warm infusion of chamomile flowers, was premised with advantage. Subsequently diaphoretics, consisting of camphor mixture, solution of the acetate of ammonia, and the spirit of nitric æther, sometimes with a little ipecacuanha or antimonial wine, were given every third or fourth hour. In many instances nothing further was necessary; but, when the bowels required aid, a draught consisting chiefly of the compound infusions of gentian and senna, or a pill containing compound extract of colocynth, the extract of hyoscyamus and ipecacuanha, was taken at bed-time.

40. In the *more severe attacks*, and when much febrile excitement and heat or dryness of skin were present at the commencement, a full dose of calomel, with James's powder, and a grain of camphor, was given at bedtime, a purgative draught being taken in the morning. The diaphoretic prescribed above (§ 39.) was also taken every three hours, with a few drops of antimonial wine, until a free perspiration was produced. A warm bath was occasionally prescribed at bed-time, and generally was of great service. After a free perspiration had been procured, a few drops of the aromatic spirits of ammonia were substituted for the antimonial wine; and, as the disease declined, mild restoratives or tonics, and a light diet, were found most beneficial.

41. When the *cough* was very severe, and dry, or attended by much soreness at the chest, a larger dose of calomel and James's powder was prescribed, as much tartarized antimony as the stomach could bear was given in the diaphoretic mixture (§ 39.), and the warm bath, and warm demulcents, were resorted to. As soon, however, as the cough became more loose, and the defluxion from the respiratory surfaces either free or abundant, the calomel and the antimonials were relinquished, and the less depressing diaphoretics prescribed. The application of a mustard poultice, or of the warm turpentine fomentation, to the chest, or of a rubefacient plaster between the shoulders, was also serviceable. At an advanced stage of these cases, the following pills, either alone or in addition to warm diaphoretics, were found most beneficial, especially in aged or weak persons.

No. 268. ℞ Camphoræ rasæ, Massæ Pilul. Ipecacuanhæ Comp., āā ℈j.; Extr. Hyoscyami (vel Extr. Papaveris) ʒss.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ xviij., quarum capiat duas, quartâ, quintâ, vel sextâ quâque horâ.

No. 269. ℞ Massæ Pilulæ Scillæ Comp., Massæ Pilulæ Galbani Comp., āā ℈j.; Pulv. Ipecacuanhæ gr. vj.; Extr. Conii (vel Extr. Papaveris) ℈ij.; Olei Anisi q. s. M. Fiant Pilulæ xxiv., quarum capiat duas, quartis vel sextis horis.

42. When influenza was *complicated with bronchitis*, or with *pneumonia*, a modification of the above treatment was generally requisite. Much mischief, however, was produced—as I witnessed in several instances, in consultation—by having recourse to a too antiphlogistic means, and to large depletions, in these complications. Not infrequently, also, congestion only of the bronchial mucous surface, or of the lungs, and great accumulations, or inordinate secretions, of mucus in the smaller bronchi, were mistaken for bronchitis and pneumonia, and treated accordingly. Even where inflammatory action was more decidedly evinced, the fact of its association with an asthenic or adynamic condition of nervous power and of vascular action, was often overlooked, and a truly *nervous* or *asthenic pneumonia*, or *bronchitis*, was treated too generally in the same manner as the primary and uncomplicated states of these inflammations. The same remarks are nearly equally applicable to the occurrence of *pleuritis*, or of *pericarditis*, in the course of the malady. Even for these, bloodletting and the rest of the antiphlogistic treatment required the utmost caution. They were beneficial only when *very early* and moderately prescribed. I derived great advantage in these complications, from the application and repetition of embrocations or fomentations with spirits of turpentine, or with either of the *liniments* in the APPENDIX (F. 296. 311.), until considerable redness, or even vesication, was produced. Calomel or blue pill, with camphor and henbane, and sometimes with digitalis or ipecacuanha, or James's powder, was generally of service; and a diaphoretic mixture of camphor julep, the solution of the acetate of ammonia, spirits of nitric æther, or a small dose of antimonial or ipecacuanha wine, was very commonly prescribed. As the more inflammatory state subsided or disappeared, the aromatic spirit of ammonia was substituted for the antimonial preparation; and a restorative regimen and change of air recommended. (See arts. LUNGS—*Asthenic Inflammation of*; and PLEURA—*Asthenic Inflammation of*.)

43. If *bronchitis* degenerated into a chronic state, camphor, the decoction of senega, or preparations of squills or of ammoniacum, were employed; and the more permanent derivatives and counter-irritants resorted to. In such cases, the means described in the article BRONCHI (*Chronic Bronchitis*, § 93—103.), rarely failed of removing all disorder.

44. In the complications with *affection of the throat, larynx, or trachea*, the warm terebinthinate fomentations or embrocations, already noticed, applied around the throat and neck, never failed of imparting complete relief; the rest of the treatment already described being generally adopted. Blisters to the throat were injurious; but, when applied to the nape of the neck, or over the sternum, they were often of service. Early in these complications, as well as in the association with bronchitis, an emetic of ipecacuanha was frequently beneficial. The warm bath, the semi-

cupium, and pediluvia were also sometimes of service. When there was much tenderness of the epigastrium, and *gastric irritation*, a mustard poultice, or the warm terrebinthinate fomentation, or other rubefacients, applied to this region, and purgative enemata, generally afforded relief.

45. At an advanced stage of the complaint, when, in consequence of its severity or complications, the powers of life indicated much depression, by the state of the pulse, the perspirations, or the abundance of the sputa, or difficulty of expectoration, camphor, quinine, ammoniacum, senega, ammonia, and other expectorants and restoratives, in liberal doses, were indispensable.

46. During convalescence, change of air, a restorative regimen, and the use of flannel nearest the skin, were commonly necessary. In other respects, the same means as have been advised for the treatment of Debility (§ 35. *et seq.*), and for convalescence from Fever (§ 167. 612.) were then requisite.

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INSANITY. — Syn. *Μανια, παραφροσυνη, παραφρονια, παραφρονησις*, Hippocrates, Galen. *Paraphrosyne, Paraphobia, Dæmonia, Dementia, Moria*, Auct. Lat. *Mania*, Boerhaave. *Amentia*, Vogel, Sagar. *Delirium Maniacum*, Hoffmann. *Phrenitis Apyreta*, Sauvages. *Vesania*, Linnæus, Cullen, Parr. *Ecphronia*, Good. *Mania Universalis*, Young. *Unsinnigheit, Tollheit, Schwermuth, Mondsucht*, Germ. *Folie, Démence, Phrénèsie, Manie*, Fr. *Mania, Insania*, Ital. *Madness, Mental derangement, Lunacy, Mental aberration, Unsoundness of Mind.*

Classif. — 2. *Class*, Nervous Diseases; 4. *Order*, Mental Disorders (*Cullen*). 4. *Class*, Diseases of the Nervous Function; 1. *Order*, Affecting the Intellect (*Good*). I. Class, III. Order (*Author*, in *Preface*).

1. Defin. *A deviation from, or perversion of, the natural and healthy state of the mind, as manifested either by the moral emotions and conduct, or by a partial or general disorder of the intellectual powers and understanding.*

2. *Insanity* — *Insanitas* — was formerly employed to signify a deranged state of the health, either of body or mind. But it became more especially applied to mental disorders — *Insania* — and lately has been entirely limited to them. It may be considered to comprise all morbid manifestations of mind, whether partial or general; or with whatever series of symptoms they may be accompanied, whether with those of excitement, or of depression, of any of the functions, either of mind or of body. Insanity, however, and especially certain moral states of it, is often nothing more than an exhibition of the natural character, and moral disposition of the individual, over which reason has ceased to exercise its control, or which has become remarkably prominent, or even per-

verted by excessive indulgence and unexercised restraint. The inordinate gratification of passions or moral emotions, not only gradually weakens the influence of reason and of self-control, but also imparts to these emotions a perverted and truly morbid character, and allows them to assume forms at variance with the established opinions and habits of the world, and with the laws of society.

3. It is extremely difficult, if not impossible, accurately to *define* insanity, or to draw a line of demarcation between it and what has usually been denominated singularity of opinion, or eccentricity of conduct. The latter states, viewed either in their moral or in their intellectual relations, insensibly pass into various acknowledged varieties of the former, and are often merely states of transition from the healthy mental manifestations, to a condition indisputably morbid. Since the time of LOCKE, it has generally been considered, that the insane have not lost the power of reasoning; but, having entertained, as real, some illusion or erroneous impression, they err, by reasoning from wrong premises. This idea appears to have been adopted by CULLEN, who remarks, that "there is generally some false perception of external objects, and that such false perception necessarily occasions a delirium or *erroneous judgment*, which is to be considered as *the disease*." But this, too limited a definition, was more extended where he states insanity to be, "in a person awake, a false or mistaken judgment of those relations of things which, as occurring most frequently in life, are those about which the generality of men form the same judgment, and particularly where the judgment is very different from what the person himself had before usually formed." But, as Dr. PRICHARD has remarked, these definitions apply only to one class of cases, and especially to *melancholia*, *monomania*, or *partial insanity* — to these forms, in which certain illusions exist, and the judgment is *comparatively* clear on all other topics unconnected with the illusions entertained. But, although the judgment seems comparatively clear on other topics than those connected with the morbid illusion, yet it must not be considered with LOCKE, that the insane make right deductions from their illusions. As Dr. CONOLLY has more justly observed, "the judgment is but the result of comparison; comparison is alternate attention; attention is a faculty dependent on the brain," — and one, I would add, which is most early and most generally disordered in mental diseases. I therefore quite agree with this writer, that, in all cases, even of partial insanity, the judgment is more or less weakened and perverted.

4. Besides the above limited forms of insanity, there are others of a more general and manifest kind — namely, 1st, *Maniacal* or *raving insanity*, in which the mental manifestations are more generally and more severely affected, the derangement being characterised by great excitement, wildness, violence, and absurdity; 2dly, *Imbecility*, and *Incoherent*, or *fatuous insanity*, in which the mind is altogether incapable of any effort; the intellects being remarkably impaired, and the ideas being rapid, unconnected, or incoherent. To the preceding forms, in which the *intellectual manifestations* are primarily and chiefly disordered, some recent writers have added another, viz. *Moral insanity;* in which the intellectual powers are but little, or not very manifestly, impaired; the disorder appearing chiefly in the emotions, habits, and conduct. In this form of mental disease, the moral and active powers are perverted or depraved; self-government is either greatly impaired, or altogether lost, and the individual is incapable of conducting himself with propriety, in many of the relations of business and society. As Dr. PRICHARD observes, "his wishes and inclinations, his attachments, his likings and dislikings, have all undergone a morbid change; and this change appears to be the originating cause, or to lie at the foundation of any disturbance which the understanding itself may seem to have sustained, and even, in some instances, to form, throughout, the sole manifestation of the disease." It must not, however, be supposed, that the understanding, in such cases, is altogether unaffected. It may not present any very obvious delusion or aberration from the usual condition; but it is certainly more or less weakened; and the patient is incapable, from habit or from impaired nervous power, of exerting those manifestations of mind upon which judgment and self-control depend, with the vigour and precision of health. Besides, the indulgence, or the inordinate excitement or sway, of the emotions and passions, leading to moral insanity, necessarily tends to weaken or to obscure the understanding, and ultimately to overturn it altogether.

5. Whilst we observe insanity arising almost insensibly from the misdirection of certain manifestations of mind, from the excitement or the over-indulgence of others of these manifestations, and from the utter neglect of some of them, aided by an impaired power of attention and comparison; we not infrequently also perceive it to proceed from those diseases and injuries which affect, more or less remarkably, the functions, circulation, and organisation of the body, and particularly of the brain and nervous systems: — fevers, in which vascular excitement becomes inordinate, or in which organic nervous or cerebral power is much depressed, frequently, derange the mental powers in their course; and the derangement, owing to organic lesion produced in their progress, may become more or less permanent. The cerebral functions are generally disordered in the more severe cases of inflammation of the brain or of its membranes, and the disorder often assumes a most violent form; but it either entirely disappears, or partially subsides, with the removal of the organic condition upon which it depended, unless when the brain has sustained some injury that unfits it for the performance of its offices. In all these instances, however, the mental alienation is merely a consequence, or symptom, of the bodily disease, which has assumed its specific form and character before the mental affection appeared. It must not, from this, be supposed, that mental disorder is not, in its more chronic and primary forms, quite unattended by signs or symptoms of physical disease, referrible either to the system generally, or to the brain more particularly, or even to both. Cases of insanity are comparatively few, in which no indication of such disease is to be traced; the chief differences being, the obvious nature, the extent, the duration, and the kind of bodily affection which has preceded, and which accompanies the mental disorder.

6. When, however, insanity has proceeded

from bodily disease, or from external injury, the latter either may have been entirely removed, or its effects only may remain; the former enduring either for a time, or more permanently, owing to the consequences of the physical affection upon the nervous power, or upon the intimate organisation of the brain, and yet the organic functions may manifest little or no disorder.

7. *Insanity* may, therefore, be viewed as a generic term, comprehending every grade of *perversion* of the *moral*, or of the *intellectual*, or of the *instinctive, manifestations of mind*, or, of any two, or of all these classes of manifestations, from the healthy states,— to such perversion, a more or less manifest but variable alteration of the *sensations, perceptions, judgment*, and *voluntary movements*, being usually added; or, in other terms, the essential phenomena of insanity are — a more or less manifest or extensive change of the functions of the brain from their accustomed healthy condition — of the sensibility, the perceptions, the intellectual and moral powers, the judgment, and the movements, without any profound, obvious, or durable affection of the organic functions.

8. Yet these latter functions are not always, or even generally, devoid of disorder. They have been too commonly either overlooked altogether, or imperfectly attended to, or insufficiently investigated; the predominance of disorder of the cerebro-spinal nervous system, and preconceived notions of the relations of mind to organisation, and of the nature of insanity, entirely occupying the attention of the observer.

9. The history of medical literature, in respect of insanity, shows, that the study of the malady, and a knowledge of its pathology and treatment, have been long influenced and retarded by prejudice and superstition, by attributing all mental disorders to supernatural agency, or by considering them in the spirit of system. It has been justly remarked by M. Foville, that works on mental alienation present the two principal characters distinguishing medical writings; — the one class being dictated by observation, and containing information, the accuracy and the utility of which can never be impaired; the other imbued with the spirit of system, and manifesting all the follies that may be conceived. The chief advantage that can be derived from the latter class of writings is, to induce us to examine, for the guidance of our own opinions, the phenomena of mental disorder with the strictest attention; to limit ourselves chiefly to the description of what we observe, and to submit with the utmost caution to the ambition of explaining.

10. In *treating of insanity*, I shall closely adhere to the results of observation, and describe— 1. The phenomena, the essential and accessory symptoms; 2. The diverse forms and classification; 3. The terminations; 4. The organic lesions observed in fatal cases; 5. The predisposing and exciting causes; 6. The physiological pathology; and, 7. The treatment of insanity. — *Connate Insanity* or *Idiotcy, Puerile Imbecility, Puerperal Insanity*, and, lastly, *Suicidal Insanity*, will be afterwards considered in distinct chapters.

11. I. Symptoms of Insanity. — The study of the phenomena of insanity, according to the several functions chiefly affected by it, is of great importance, not only in arranging the various forms of the malady, but also in classifying the patients, and in determining with precision and success the method of treatment. In the general view, therefore, which I am about to take of the essential and related symptoms of insanity, I shall consider,—1. Those furnished by the *sensibility*, or connected with the *impressions*, the *sensations*, and the *perceptions*; 2. The phenomena exhibited by the *instinctive*, the *intellectual*, and the *moral manifestations*; 3. The symptoms connected with the *locomotive apparatus*; and, 4. The phenomena furnished by the *organic functions*. In the *general description* here about to be entered upon, I shall confine myself to those states of insanity, the existence of which admits not of dispute, and leave, until I come to the consideration of the special forms of alienation, the discussion of those *states* which are the least manifest, or which have not been generally admitted as constituting forms of insanity, either from their *slight or partial nature*, or from the circumstance of the *moral manifestations* being chiefly affected, the intellectual powers being much less prominently disordered (§ 4.).

12. i. The Symptoms furnished by the Sensibility are extremely numerous and diversified. They consist chiefly of false perceptions, arising from one or other of the following sources: — 1st, from disorder of the organ receiving the impressions; 2dly, from an affection of the nerves conveying the impressions, the organ itself being sound, 3dly, from profound disease of the parts destined to perceive them, the morbid impression taking place without any external excitement or cause; and, 4thly, from disorder of the general sensibility. But, as will be shown in the sequel, false perceptions, or illusions, more frequently proceed from two or more of these sources, than from any one singly.

13. *A. False perceptions arising from a disorder of the organs receiving the impressions*, are evinced by the state of these organs, particularly in regard of the presence of actual disease of them, and by the effects following the abstraction of their respective stimuli. The existence of disease will generally be ascertained upon a close examination of the sense, whose functions seem especially disturbed; and it is not infrequently observed, both where disease of the sense exists, and where it cannot be detected, that the shutting out of the appropriate stimulus — as by closing the eyes, or the ears, or the nostrils — arrests the morbid perception haunting the patient, by preventing the production of sensation. Esquirol, Reil, and Foville suppose that, where the morbid perception thus ceases upon shutting a particular sense, the cause of it exists in that sense: but this is not the case; the error arising from the circumstance of their confounding, with most of their countrymen, sensation with perception. A sensation will be morbid where the organ is disordered, but it will not necessarily be followed by a morbid perception, unless either the nerves conveying the sensation, or the brain itself taking cognisance of the sensation, be disordered, as respects either the state of its organisation or circulation, or the discharge of its functions. In cases, therefore, where closing the organ of sense causes a morbid perception to cease, such perception is not to be referred altogether to the state of the senses, but partly also to the organ of intelligence — to the understanding, which is obviously incapable of correcting or judging aright the re-

port conveyed by the sense especially affected. Indeed, the intellect may be so weakened as to be more than usually susceptible of derangement, either when inordinately excited by the senses, or when manifest disease of them exists. In cases of this description, the mind is incapable of paying due attention to the various circumstances connected with the morbid sensation or impression, of comparing them, and of judging them as in health; and this obtains especially when the sensation is novel, or even indistinct, as well as when it is inordinate, or too strong, relatively to the nervous susceptibility — to the cerebral power of the patient; and when it either forcibly or unusually impresses a mind already more or less deranged. Although, therefore, the disorders referrible to the senses, as ophthalmia, amaurosis, ottitis, ozena, caries of the teeth, &c., are sometimes concerned in the production of false perceptions in the insane; yet equally much, if not more, is to be imputed to the brain itself, and to its functions, which are mainly concerned in producing the morbid perception, and are obviously incapable of ascertaining the illusion: the morbid *sensation* appertains to the sense, and the nerves connected with it, but the false *perception* is chiefly the act of the brain.

14. *B. False perceptions without disease of the organs of sense.*— False perceptions of this kind have been called *illusions* by some, and *hallucinations* by others. M. Esquirol proposes to confine the latter term to them; and he defines them to be sensations perceived at a time, when there are no appropriate external objects present to excite them in the organs of sense. This class of false perceptions is much more common than the foregoing, and occurs in every possible form. Both the blind and the deaf may be subjects of illusions of the senses of sight and hearing respectively. The majority of those who are haunted by hallucinations of this kind suffer more in solitude, in darkness, and during silence, when the senses are in a state of repose, than in other circumstances. The distractions, incitements, and sensations experienced in society sometimes allay or obscure these illusions; but, however powerful, much more frequently they have no such effect, the mind continuing, nevertheless, to be engaged only with its morbid perceptions. The patient, when he speaks, is interrupted by them; he answers to voices which call upon or address him, or contemplates objects which have no existence.

15. Sometimes the illusions relate to one sense, and occasionally to more than one, or even to all the senses. Those of hearing are the most common; next those of sight, smell, and taste; the illusions connected with the two last being often associated. Those belonging to the sense of touch are the most rare.

16. Darwin supposes that hallucinations proceed from inflammation of the origin of the nerves of sensation; and M. Esquirol says, that "the false sensations of those subject to hallucinations are images and ideas reproduced by the memory, associated by the imagination, and personified by habit. A person in such a state converts the product of the understanding into a corporeal form; he dreams while he is awake; but, in those who dream, the ideas which were entertained while awake continue during sleep, whilst he who is in a delirium perfects his dream when waking." M. Foville justly remarks upon this opinion of M. Esquirol,— 1st, That hallucinations often do not furnish precise or determinate sensations like those which memory recalls — confused objects, or vague sounds, &c. are frequently only seen or heard: 2d, With many, however diversified or rapid the succession of ideas engaging the imagination, the illusion continues limited to one sensation, and is always reproduced in the same form; the patient always sees the same object, hears the same voice, or inhales the same odour: 3d, The delirium of the insane depends, in many cases, upon false sensation. All the wanderings of the mind are only the consequences of this. When patients recover, they say, "I have seen and I have heard as distinctly as I now see and hear you," while at the same time they are able to give an account of the errors of their imagination: 4th, In some insane persons, the hallucinations have preceded the delirium, and have been recognised by the patients themselves at the commencement as false perceptions; but at a later period, when combined with intellectual derangement, they have been regarded by them as real: lastly, One sometimes finds, in cases of hallucination, changes of the nerve destined to convey impressions; and although it may not be readily conceived how an alteration of the optic nerve, for instance, determines false perceptions relative to vision, it cannot be more easily explained wherefore disease of a nerve of motion in neuralgia causes involuntary movements of the muscles; we may as well believe that alteration of the nerve is the true and sole cause of the hallucination, although in the healthy state the will may be the only cause of voluntary motion, as that external excitants, the impressions on the organs of sense, are, in health, and during waking hours, the only natural cause of all sensation and of all perception. There is, besides, this analogy between the two cases,—that neuralgia of a nerve of motion does not ordinarily bestow the influence of the will on that nerve, and by consequence upon the muscles, and that the alteration of a nerve of sensation giving rise to hallucinations does not destroy the perception of sensorial impressions, although it often disturbs and impedes them.

17. It is much better supported by close observation and *post mortem* research, and hence much more probable, that illusions or hallucinations arise from lesions of the nervous parts intermediate to the organs of sense and the centre of perception, or from alterations of the parts of the brain into which the nerves of sensation enter, or in which they terminate. Illusions similar to those which occur in the insane, sometimes take place in persons whose intellects are sound; but a healthy understanding appreciates the false perception correctly, whereas the disordered mind confounds them with realities. It may hence be inferred that they are the effects of lesions which do not necessarily or constantly implicate the understanding, but which more frequently, owing to intensity or extent, affect the intellectual faculties, and especially the powers of attention and reflection.

18. Whatever may be the point of organic departure of hallucinations, they are lively or sad, capable of inspiring sentiments of benevolence, or of arming the hand of the maniac with an instrument of homicide. The supporters of the doctrine

of **Gall** suppose that the characters they assume entirely depend upon the portion of the brain affected — upon the point in the organ whence they proceed. The effects, however, of hallucinations upon the minds of the insane are undoubtedly as real and as positive as the impressions produced by external excitements.

19. *C. Delusions or false perceptions connected with the general sensibility.*— These disorders, from the most simple and circumscribed to the most general and complicated, are constantly met with in mental diseases. Persons who believe that they have in the belly, or in the chest, or in the head, an animal which preys on them, are as much the subjects of disordered sensations as those who say that they are without a stomach, or a heart, or head, and who otherwise are tormented by the most strange feelings. Those who believe that they have the devil in their bodies are victims of morbid sensations, which their disordered mental faculties refer to this cause. In many cases the delusion, false perception, illusion, or whatever else this kind of symptom may be called, evidently results from a state of suffering — from disease in the parts to which the delusion is referred. They are, in fact, symptoms dependent upon local lesion, traces of which are generally discovered on examination after death, the morbid sensation being misinterpreted by the erring judgment of the patient. M. **Foville** justly remarks that, without the state of pain, or morbid sensation, occasioning the delusion, the delirium of the insane might take another direction, and might be more easily appeased; and that one of the most efficacious means of attaining this object is to remove, when this can be done, the pains or sensations which give rise to the delusion.

20. In some instances, the delusion is unattended by any appreciable disorder of the part to which it is referred. It may depend, judging from analogy, upon an alteration in the nerves conveying impressions made in parts which they supply, or to which they are distributed; or even in those which are connected, or sympathise, with a disordered structure. The well-known example of pain referred to parts removed by amputation may be adduced in support of this view. — From what has now been stated, the delusions depending upon the general sensibility may be divided into — 1st, Those which seem to proceed from some alteration or lesion of the parts to which they are referred; and, 2dly, Those which seem to depend rather upon the state of the nerves transmitting the sensations, or upon the nervous centres themselves, than upon any appreciable lesion of the parts which are the seat of the delusion.

21. *a. Delusions with lesion of the parts to which they are referred.*— Many instances of this kind of delusion have been mentioned by authors. M. **Esquirol** states, that in one of his patients there existed considerable tension of the abdominal muscles, with tenderness of the abdomen. The devil, the patient said, had placed a cord from the pubis to the sternum, and a demon in her body, which burned, pinched, and bit her heart, and tore her entrails. Amongst other alterations found after death, the usual changes consequent upon chronic inflammation of the peritoneum and pericardium were found. Here the relation between the symptoms of the physical change and the mental delusion is sufficiently manifest. The same writer, amongst other instances, mentions the case of a female who believed that she had no longer any body, and that it had been carried away by the devil, for she felt nothing. M. **Esquirol** inserted a pin under the skin of her arm, without causing any evidence of pain. The loss of sensibility was evidently in this case connected with the production of this particular delusion. Another female fancied that the devil lay with her: she had constant pain and tenderness in the region of the uterus; and these were doubtless connected with the origin of the insane idea. There is here a very evident similarity of these delusions to the false perceptions attending disease of an organ of sense. All these morbid sensations are correctly judged, and their real natures appreciated, by the sane mind; but the disordered intellect is unable thus to recognise them, variously transforms them, and contemplates the forms into which it changes them, as real existences; superstition, previous habits and occupations, predominant feelings and religion, severally imparting to them the shapes which they assume, or the colour and character which they present. Similar to the above instances is one mentioned by M. **Foville**. A man, who received a severe wound at the battle of Austerlitz, continued insane ever since. His delusion is founded on that which he no longer recognises; he has lost the sensibility of the surface; and he believes that he no longer exists. He says, that that which you see there is not he; that it is a machine which has been made to resemble him, and which is very badly made. This man often falls into a state of complete immobility and insensibility, which last several days. Vesicatories and sinapisms never produce the least signs of pain. He often refuses to eat, saying that the machine which has replaced him has no belly, and that it has no need of food. His external surface and extremities evince no sensibility. The strange delusion which this patient labours under is manifestly founded on the loss of sensibility in these parts, and on the absence or marked modifications of organic sensibility.

22. *b. Delusions connected with the general sensibility that are independent of alteration of the parts to which they are referred,* seem to be more rare than those in which some lesion or other exists. It is the reverse in regard of false perceptions connected with the special sensibility — with the organs of sense. Not infrequently, however, these different kinds of false perception — of delusion and hallucination — are associated in the same case. The delusions of most insane persons have more or less reference to, or are influenced by, their education, their habits, their prejudices, their studies, their fears, &c.; and are often attributed by them to sorcery, to demons, to various physical causes, &c. A weak superstitious person believed that he had the devil in his belly. For a long time he could not make out how he got there; but he at last fixed upon the idea, that his father sold him to the devil in the presence of a notary for a sum of money. Just before he was taken ill, this young man accompanied his father to a notary, where they met a stranger who paid the father some money. This was in hot weather, and, on leaving the notary's office, the young man took some glasses of bad cider, and

complained soon after of pains in the abdomen, which have since continued to afflict him; and it was upon this circumstance he based his delusion.

23. Too great importance cannot be attached, in the practice of mental disorders, to the various lesions of sensibility, or too much attention paid to false perceptions and delusions of all kinds, both as respects their connection with physical lesion, and as regards their consequences, or influence upon the subsequent course of the malady. It is very manifest that the patients, who are the most dangerous to themselves and to those who are about them, are those who are subject to some one of these false perceptions or delusions. One insane patient hears a voice, which says to him, kill him or them. He resists the impression for some time; but at last believes it to be a supreme command, and obeys it. Another has recourse to suicide, either to avoid the punishment or distress of these hallucinations, or in obedience to orders, which he believes he has received from the Almighty, and which he is bound to execute. There is much more reason to distrust a maniac, who is subject to delusions or hallucinations, and to exercise strict control over him, than one who is not so afflicted.

24. All the foregoing kinds of false perceptions require also very close observation, especially with reference to their physical relations, — to the states of the organs to which they are referred, — in order that appropriate methods of treatment should be employed. It is obvious that, if the delusion be founded upon, or in any way connected with, functional or structural lesion, means should be used to remove such lesions; for, as already shown (§ 19.), organic disorder either occasions, or perpetuates, or aggravates, the morbid sensation, which the deranged mind perceives or construes falsely.

25. *c. Various other lesions of sensibility are often observed.*—Insane persons often tear themselves with their teeth or nails, without manifesting the least pain. Some eat straw, grass, &c.; some even their own excrements; and others gnaw their fingers or extremities. Patients have, in a few instances, picked or scratched parts of their own bodies, until large cavities or holes have been thereby made (ESQUIROL, FOVILLE, &c.). Some possess a remarkable power of bearing, without suffering, extremes of heat and cold. Some authors allege this to be general among the insane, but this is an error: the greater number do not manifest any sensible difference in this respect from the healthy. Others deny this altogether; but it is certain that many insane persons bear, without appearing to suffer, and without feeling the least inconvenience, the most excessive cold. CURRIE, RUSH, ESQUIROL, FOVILLE, and others, cite numerous instances proving this circumstance, — not the least coryza, or catarrh, or complaint whatever, having followed the exposure to cold. Some patients can fix their eyes upon the most intense light, and even upon the sun, without being dazzled thereby. M. FOVILLE adduces several instances, where vision was by no means weakened by having the eyes fixed for some time upon this luminary, in the month of July; the patients being able to read, immediately afterwards, a book printed in very small characters. Most insane persons readily addict themselves to the use of tobacco. They smoke, chew, or snuff it with avidity — females as well as males — when they can obtain it.

26. ii. SYMPTOMS APPERTAINING TO THE MORAL, INTELLECTUAL, AND INSTINCTIVE MANIFESTATIONS OF MIND. — The disorders of these manifestations are as numerous as the possible combinations of our ideas, and as diversified as our passions, propensities, prejudices, affections, and education. They present themselves under two forms: in some cases they have reference only to a single train of ideas; in others, they comprise a greater number. It is especially to this class of symptoms that the French pathologists have applied the term *delirium* — the disorder of the mental faculties forming with them the delirium of the insane; and upon the limits or extent of this disorder has been founded the division of intellectual derangement, or of the delirium, into partial or exclusive, and vague or general. The mental disorder, moreover, may be evinced chiefly in the moral, or in the intellectual, or in the instinctive, manifestations, or it may extend itself much more generally. It is according to the nature and extent of the disorder, that arrangements of mental diseases have commonly been attempted. In the one class, whatever may be its limits or extent, there is only a perversion, or an aberration, of the faculties; in the other, the faculties are altogether lost or obliterated; and this privation is either congenital or primary, or accidental or acquired. " Who is there," says M. ESQUIROL, " who can flatter himself to have observed, and to be able to describe, all the symptoms of mania, even in a single individual?" It is particularly to the very extensive class of symptoms now under consideration, that this reflection is applicable. How are we, observes M. FOVILLE, to comprehend the fugitive and multiplied shades of general delirium? How are we to trace the infinite subtilties of partial delirium, or monomania? In *general delirium*, or *maniacal* and *incoherent insanity*, ideas the most extravagant, images the most fantastical, associations the most discordant, emotions the most opposed, succeed each other with electric rapidity. The maniac confounds in his mind heaven, earth, and hell, his domestic affairs, his affections, politics, and morals. He speaks in verse, sings, laughs, weeps; utters his sentences with marked or peculiar emphasis; he speaks by turns in all the languages he may know; retraces his steps, lifts or extends his hands or tosses them right and left; dances, jumps, and utters menacing cries; rushes on his companions, tears all that comes in his way; strips himself naked, rolls on the ground, &c. &c. In these cases the functions of mind are not destroyed, but they are morbidly excited — they are actively deranged — and are no more like their healthy condition, than convulsions resemble the quiet walk of a man in health. On the other hand, in *partial insanity*, or monomania, the mind is concentrated upon one object or train of ideas, whatever it may be. The patient displays infinite resources to justify his error, and applies the most imperturbable attention in pursuit of it.

27. Disorders of the passions, and more especially of the intellectual faculties, particularly characterise general or maniacal insanity; disorder of the affections chiefly mark partial insanity, the intellectual faculties being but little affected. It is in the former that the greatest

agitation is observed, many patients vociferating day and night, until their voices become, in a short time, so altered, that, in spite of their efforts, they cannot be heard at the distance of a few paces — a species of *aphonia*, peculiar to the maniac. Although this aphonia is partly caused by the efforts to cry, still it seems to be in some degree owing to the state of nervous influence, for some patients evince it from the very accession of their malady. Some maniacs present the peculiarity of repeating all their actions, questions, or expressions, or even their discourses, a certain number of times. The simple repetition of these acts or expressions has been referred to a want of harmony in the action of both hemispheres of the brain; but the repetition is sometimes oftener than once.

28. Amongst maniacs are found instances of erotic excitement, of an exaltation of parental or filial affection, or of the ties of friendship. Some are ferocious, others quarrelsome, others have a propensity to murder, or to steal; and many are remarkably cunning and deceitful. All large establishments contain maniacs of pride; princes, sovereigns, great dignitaries, and even gods themselves, are not rare. Vanity is observed in all its extravagances, furnishing the best lesson to the vain fools who strut their hour on the stage of modern society. Here are found patients a prey to the most distressing anxiety, to the utmost mental agony; seeing in the present and in the future nothing but despair, imploring death, and desirous of inflicting it upon themselves, in order to escape from their miseries. Some dream of nothing but change, of distant journeys or voyages; others have lost their memory of persons or of things; and several, particularly during the exacerbations of the disease, can no longer speak their own language, but give utterance instead to confused and fantastical sounds, delivered in the tone of a continued discourse. Painters, musicians, and artists of all kinds, appear among those whose education has not been directed to the arts; and even poets, or, at least, rhymers, spring up amongst those who even have not learnt to read. Visionaries of all kinds abound; some apply themselves incessantly to the solution of the greatest problems of nature, or of the most difficult questions in metaphysics, religion, politics, political economy, &c., although uneducated; and prophets, saints, and martyrs are not uncommon.

29. Ought it to be inferred from all these varieties, as regards the intellectual disturbance, that each of them is connected with an isolated and distinct lesion of a particular part in the brain? Ought we, in the present state of our knowledge, to admit that the organ of the understanding is composed of an assemblage of particular and distinct organs for each propensity, and for each endowment? Ought we, in fact, to adopt, to its full extent, the psychological system, according to which these questions are answered in the affirmative? It would be out of place here to discuss the real value of a psychological system; but it becomes necessary to notice the assertions of those authors who maintain that, in partial insanity, particular forms of the skull correspond with the varieties of the mental affection; that they are able even to trace the propensities, the talents, dispositions, and dominant ideas of their patients. However, impartial observation of the insane, as M. FOVILLE very justly remarks, does not confirm the accuracy of these assertions. This writer, whose experience is most extensive, and powers of observation very great, states, that it is certain, that the same partial delirium, in many patients, corresponds to opposite forms of the same part of the skull. In some religiously insane, he has found the superior and middle part of the cranium remarkably developed, whilst, in others, the same portion was much below the ordinary magnitude. The insane who suppose themselves kings, emperors, princes, &c., are far from presenting, generally, a marked development of the regions of the organs of ambition, domination, vanity, &c., as assigned to them in the system of GALL, but are often inferior in this respect to those who pass the whole day in sweeping or cleaning the courts, &c., or who are most interested in the most menial occupations. If there exist distinct organs for every faculty or propensity, it is not necessary, I admit, that their development should be at all extraordinary, in order that irritation or inflammation should excite their activity, or occasion prominent or peculiar phenomena as respects them. But it may be stated, at once, that we often find, in cases of partial insanity, lesions as extensive as in those where the mental disorder was general; and that we occasionally observe instances of partial delirium, that cannot be the result of the excessive, or of the irregular, exercise of any fundamental faculty, or of vascular disorder limited to any particular part of the brain, to which such partial affection may be referred, even by those who espouse the doctrines in question. To the lesion of what fundamental faculty does the insane notion of a man correspond, who believes himself changed into a woman, *et vice versâ?* or of a person who believes himself transformed into a dog, assumes his habits, barks like him, walks on all fours, bites, &c.?

30. It may be truly said of partial insanity, that whatever, in the course of a man's life, may be to him an object of a particular regard or propensity, of a distinct taste, of a ruling passion — all the bizarre or fantastical ideas which his mind may entertain, may, in a state of disease, become the subjects of his delirium or hallucination; that many delusions — many forms of partial insanity — cannot really be referred to lesion of a particular faculty, or of that portion of the brain which has been considered the origin of such faculty; and that, in short, where it appears reasonable to refer them to an alteration of this kind, attentive examination of the conformation of the skull is far, in the majority of cases, from corresponding to the assertions of the authors of the psychological system in question. It must not, however, be inferred from what has just now been advanced, that attentive observation of the forms of the skull of the insane is of no use; on the contrary, a regularly developed cranium, of a reasonable size, ought, *cæteris paribus*, to assist an opinion, as to the possible issue of the disease, very different from that inferred from a small, confined, and deformed skull. What has been stated applies only to the assumed seats of fundamental faculties, exclusively or principally affected in certain patients. In short, the disorders of the intelligence in the insane are partial or general, as regards the intellectual faculties, properly so called, and likewise in respect of the passions and affections.

31. In a very great majority of cases the insane are unconscious of the state of their minds, and are offended at being considered mad. They even accuse those of insanity, who do not admit the integrity of their intellects. Some, on the contrary, are conscious of being deranged, but are unable, nevertheless, to correct the aberrations of their reason. These rare instances show what benefit may be expected to result from attempts to convince an insane person that he is deranged.

32. iii. THE SYMPTOMS FURNISHED BY THE LOCOMOTIVE ORGANS. — The disorders of voluntary motion in the insane may be divided into — 1st, Those which are temporary and local; and, 2dly, Those which are persistent and general. — *a.* In many, the movements become remarkably vigorous and energetic; an irresistible inclination to run, jump, gesticulate, &c. manifesting itself, produced by the general irritation, which occasions the mental affection. These, however, cannot be regarded as important or specific alterations; but sometimes, during the paroxysms of the alienation, the muscles of the face, or of an arm, or of a leg, are agitated by *irregular movements, like convulsions,* which are strictly local, are very distinct from the general convulsions of epilepsy or hysteria, and resemble the involuntary movements attending neuralgia. These irregular and convulsive actions of the muscles of a single part or limb are met with chiefly in the intermittent or paroxysmal forms of insanity, or in exacerbations of the disease; and are evidently dependent upon the morbid condition of the brain, from which the paroxysms or exacerbations of mania result. They are only occasionally observed, and were first described by M. FOVILLE.

33. *b.* An incomplete and *peculiar form of Palsy* is much more common in the insane than the foregoing local convulsive action, and is even much more serious. It is not mentioned by the older writers, and it is but slightly noticed by PINEL. M. ESQUIROL has studied it with much care, and especially with reference to the ulterior progress of the mental disease. More recently, MM. DELAYE, BAYLE, and CALMEIL have investigated it still further. This affection, usually designated the paralysis of the insane, and general or incomplete palsy, consists of a general and gradual loss of power in the voluntary muscles. It commences with an embarrassment of the motions of the tongue, or with indistinct articulation. Patients hesitate for a time at some syllables, which they overcome only by an effort. They are unable to pronounce some letters, — the R, for instance, — or they express them with difficulty. Afterwards a similar embarrassment is observed in the movements of the arms, legs, &c.; and lastly, in all the muscular system. The disorder possibly commences as early in the muscles of the limbs as in those employed in articulation; but as these latter require a greater precision of action for the due performance of their functions than the former, they more readily betray the incipient disorder, and this disorder is thus more early brought to the notice of the physician.

34. It requires, however, some experience to enable the physician to ascertain the commencement or earlier grades of this affection. When it has made some progress, the diagnosis is easy. The embarrassment of pronunciation is then very sensible. The patient cannot speak without throwing all the muscles of the face into action. The walk is vacillating; the motions of the arms and hands are unsteady and awkward,—and these last constantly tremble, and are incapable of retaining a determinate position. It is not, however, as yet, the force, so much as the precision, of the movements that is impaired. A patient may squeeze any object with much power, but he cannot execute any delicate work, or even button his own vestments. In attempting to run, his course is irregular, or attended by deviations to the right and left, like to an intoxicated person; he exhibits the appearance of suppleness, but a state of morbid tension exists in all the muscles of the trunk, extremities, head, and face; he comes awkwardly down on the soles of his feet, his arms are extended, the eyelids are widely open, the jaws firmly closed. Sensibility becomes blunted, so that irritation of the skin is not perceived until after some time. The paralysis of the insane is often more marked on one side of the body than on the other; but sometimes the progress of the affection varies, or even alters materially in either side.

35. *c.* If this complication be observed with attention, *two distinct stages* may be recognised: — In the *first*, the movements, although uncertain, retain a certain vigour — a rigidity of action, rather than power. This gives way, after a time, to the *second,* — to a relaxation — or a state of resolution, always increasing, of the muscular system. The patient becomes incapable of exertion; the features sink; the eyelids open sluggishly; the eye is dull; the jaws fall; the lips are pendant; and the excretions are involuntary. The patient is incapable of retaining a favourable position, and at last lies prostrate; the parts pressed upon by the weight of the body being excoriated, and ultimately gangrenous. In the course of this state of disease, attacks of cerebral congestion, followed by convulsions and coma, which continue for many hours, and are frequently repeated for several successive days, are often observed. After these attacks, the intellectual debility and aberration, and the paralysis, which are generally coordinate, are much more prominent. In many, variable periods, during which the symptoms are stationary, are interrupted by seizures of this kind, after which the malady proceeds rapidly, without ever retrograding, until the last degree of intensity is reached.

36. In the great majority of those who experience this complication, the paralysis does not commence until after the appearance of the intellectual disorder; but in some the insanity and palsy appear simultaneously; and in a few the muscular affection precedes the mental derangement. It should, however, be kept in recollection, that a general paralysis, similar in all respects to that now described, occurs, in rare instances, without being followed by insanity. I have seen several cases of this kind; and the circumstance has likewise been noticed by MM. DELAYE and FOVILLE.

37. iv. THE PHENOMENA EXHIBITED BY THE ORGANIC FUNCTIONS. — These functions present but little that is determinate, although they are rarely observed in a truly healthy state. Digestion is usually disordered in the earlier periods of insanity. The appetite is deficient or altogether lost; and more or less thirst is present. The mouth is clammy, and often dry; the tongue is white, with the papillæ often erect, or it is loaded

or slightly furred, or covered by a slimy mucus. It is often red at its point and edges. The salivary secretion is commonly scanty or frothy, but in a few instances it is increased, or frequently rejected. The *bowels* are more or less constipated, and the *urine* somewhat coloured. These symptoms very often disappear under an appropriate treatment, the mental disorder continuing even without material change; and the appetite returns, or is even increased. Sometimes the appetite is excessive from the commencement, although the other symptoms just mentioned are all present. Costiveness is the most general and persistent symptom, often continuing through the whole course of the malady.

38. The *pulse* is sensibly accelerated in the majority of cases. Authors have erred remarkably — even recent writers copying the blunders of those who have preceded them — in saying that the disease is unattended by any disturbance of the pulse. Rush found the pulse affected in seven eighths of his cases; and M. Foville observed a large majority of cases of uncomplicated insanity, with more or less acceleration of pulse, the mean pulsations in those examined by him being 84 in the minute. In comparatively few the pulsations were under 70, and in none were they below 60. The *heart's* action is attended by increased impulse in the majority of cases; and in a few it is tumultuous, irregular, or even intermittent. In some it is weak, and almost inaudible, or insensible to the touch. Organic change of the organ, in some one or other of its numerous kinds, is very common, especially in old cases of insanity. M. Foville states that he found some alteration or other of the heart in five sixths of the cases of insanity that he had examined after death during three years. But these changes are accessory, or not necessarily connected with the mental disorder: they are even, in many cases, produced by it.

39. v. Accessory Symptoms. — In all recent and acute, as well as in all prolonged cases, in which the symptoms have retained or assumed an acute character, obstinate *insomnia* is generally present. I have seen it often precede the mental disorder; and where the insanity presents an intermittent or paroxysmal form, it attends the accessions. This symptom is frequently most remarkably obstinate and prolonged; insane patients sometimes passing weeks or even months without the least sleep. When sleep is obtained, it is disturbed, dreaming, or wandering, or even raving. As to the symptoms furnished by the external aspect of the body, but little can be stated, as they vary with the habits and conditions of the patients, and the stages of the malady. In the great majority of cases, the expressions of the countenance correspond with the nature of the ruling passions, which manifest themselves with so much the more energy and truth, as nothing counteracts their operation. The eyes are unfixed, unsteady, wild, or timid, and incapable of returning a determined or steady look. The conjunctiva is injected, and the conchæ of the ears more or less red. The cheeks are not always coloured similarly to these two parts; for they may be either pale or red, or livid, whilst these present the highest degree of vascular injection. The skin is hot and dry, or hot and moist. The heat is greatest and most constant over the forehead, the extremities being frequently at the same time cold.

40. The co-existence of some important affection of the digestive, circulating, and respiratory organs with insanity sometimes imparts to the latter a modified or intermittent form. It is not rare to see phthysis breaking out during the progress of the mental disorder, and suspending it for a time. The patient in this case recovers his reason, whilst the pulmonary disease makes progress: but if this progress is arrested, the insanity returns; and these alternations often succeed each other until death takes place. Frequently an acute disease supervenes upon, and interrupts the course of, insanity, which reappears in all its severity after the accidental omplication has subsided. M. Foville thinks that this effect is oftener produced by acute inflammations of the chest than by those of the abdominal viscera. And lastly, an acute disease, thus occurring in the course of the mental affection, sometimes entirely suspends the latter, and is followed by complete recovery.

41. On passing in review the principal symptoms of mental alienation, disorders of the intellectual and moral powers only will be found constant. These disorders will often exist in persons whose sensations and movements are performed as regularly as in health; but they will also be frequently associated with morbid sensations, false perceptions, and delusions. In this latter case the conversation and actions of the insane will be as much the results of these sensations and perceptions, as the discourse and actions of reasonable persons are the results of external circumstances and rational inferences; the intellectual disorder then truly appearing to be chiefly the consequence of the affection of sensation and of perception. Where the mental alienation is associated with disorder of the voluntary movements, the connection between both is very different from that existing between the former and the sensations and perceptions. The voluntary movements are disordered as a contingent consequence of the lesion of the brain, that either is caused by, or occasions, the mental disorder; and are hence merely a complication, but one indicating a hopeless state of the malady. Lesion of voluntary movements, as described above (§ 32.), may, in rare cases, exist without insanity, but is generally consecutive upon, and an occasional complication of, disorder of the perceptions, or of the intellects, or of both the perceptions and intellects. This complication, moreover, merits the strictest attention in practice; for, where it exists, the perceptions and faculties are not merely simply perverted, but are, with the sensations, weakened, or even blunted. The memory is impaired; and association of ideas, whether true or false, is no longer vigorous. The affection of the intellects assumes an analogous state to the disorder of voluntary motion; the mental powers, as well as the muscles of volition, are universally weakened, and ultimately paralysed.

42. It is evident that the proportion of cases in which the mental disorder is simple, and of those in which it is associated with lesions, either of sensation and perception, or of motion, or of both, must vary with the numerous circumstances connected with the predisposing and exciting causes, and with the duration and treatment of the malady; that the proportion of each class in lunatic establishments, especially, will vary with the regula-

tions by which they are governed, and particularly with the restrictions as to the kind of cases admitted, the duration of the malady previous to admission, and the continuance of the patient under treatment. On this point, therefore, no precise information can be adduced. M. FOVILLE, however, states, that in an institution containing 334 insane persons, of whom 144 were men and 190 women, he found 214, of whom 94 were men and 120 women, presenting intellectual disorder without complication; 89, of whom 34 were males and 55 females, manifesting various disorders of sensibility; and 31, of whom 22 were men and 9 women, labouring under general paralysis. According to this account, the number of cases of simple intellectual insanity is the most considerable; the proportion of cases associated with deranged sensibility and perception, somewhat greater in females than in males; and the number of those complicated with general paralysis, was much greater in men than in women.

43. II. ARRANGEMENT OF MENTAL DISORDERS. — It is not more easy, satisfactorily to arrange the disorders of mind, than, in many instances, to determine the presence of disorder, and especially of that which is more strictly moral, the existence of which, if not always questioned, has been very generally overlooked, until contended for by a few recent authors.

44. The ancients divided insanity into *Mania* and *Melancholia*. By mania they understood a general delirium, and by melancholia a partial delirium. This division has descended down to a recent period, receiving, from time to time, some modifications, which have not prevented its being still adopted by some modern writers.

45. M. PINEL arranged mental diseases into — 1st, *Mania*, which he defines a general delirium with agitation, irascibility, and a propensity to furor; 2d, *Melancholia*, or exclusive delirium, with debility, moroseness, and a propensity to despair; 3d, *Demency*, or a particular debility of the operations of the understanding, and of the acts of the will; and, 4th, *Idiotism*, or a sort of stupidity more or less marked, with a nullity of character, and a most limited circle of ideas.

46. Dr. RUSH, in his excellent treatise on diseases of the mind, divided them into *partial* and *general*. He subdivided the *former* into — 1st, *Tristimania* (hypochondriasis and melancholia), in which a person entertains false ideas respecting his person, his affairs, and his condition, whereby he may be plunged in despair; and, 2d, *Amenomania*, in which the delirium is lively. The *latter* he subdivided into — 1st, *Mania*, or violent general delirium, with propensity to furor; 2d, *Manicula*, or a milder form of the preceding, or a chronic state of it; 3d, *Manalgia*, or a general torpor of the body and mind; 4th, *Dissociation*, or a state similar to the Demency of *Pinel*; and, 5th, *Fatuity*, or a condition generally denominated Idiotism by French nosographists.

47. M. ESQUIROL arranged mental disorders into — 1st, *Mania*, general delirium; and, 2d, *Monomania*, partial delirium. The term monomania conveys a clearer idea, and one more applicable to the diversity of cases of partial insanity, than the word melancholia. He applies, with great propriety, the term *idiotism*, or idiotcy, to congenital abolition of the mental faculties, and that of *dementia*, or *demency*, to accidental loss of them. M. GEORGET, adopting the division of ESQUIROL, added a fifth species, consisting of acute dementia, described by the latter as a variety only.

48. GALL endeavoured to connect the states of partial insanity to the respective fundamental faculties into which he divided the manifestations of mind. His pupil, SPURZHEIM, whilst he kept in view the doctrines of his master, admitted four states of insanity: viz. idiotism, dementia, alienation, and irresistibility.

49. Dr. M. BURROWS, extending the signification of the word insanity beyond most of his predecessors, has divided it into — 1st, *Delirium — delirium tremens*; 2d, *Mania — puerperal mania*; 3d, *Melancholia — suicide*; 4th, *Hypochondriasis*; 5th, *Demency*; and, 6th, *Idiotcy*. He observes "that delirium and hypochondriasis have better claims to be considered as distinct species than mania and melancholia. It is true that, if delirium be received only in its ordinary acceptation, as symbolical of intellectual disorder, it does not merit the rank of a distinct malady. But I think that there is ground to consider it as a frequent idiopathic affection, though certainly much more generally as sympathetic, and often as symptomatic." On this topic it is unnecessary to offer any remarks, or to do more than to refer the reader to what I said when discussing the *diagnosis* of DELIRIUM and HYPOCHONDRIASIS.

50. Professor HEINROTH has furnished a very elaborate arrangement of disorders of the mental faculties in his able work. He considers the derangements of the mind to be limited in number and in kind only by the diversities of the mental manifestations; and he bases his classification of these disorders upon two distinctions: the *first* is the difference which consciousness shows to exist in our mental operations; or which exists between — 1st, the feelings or sentiments; 2d, the understanding or reasoning powers; and, 3d, the will. The emotions of joy, grief, pleasure; the processes of reflection and contemplation; and the acts of the will or of self-determination; are *three* kinds of mental phenomena, which he considers to be so clearly distinguished from each other, as not to be confounded. According, therefore, as the cause of insanity is in relation to one or other of these kinds of mental manifestation, or as the disorder refers itself to either of these, or as it affects the feelings, the understanding, or the will, so it is placed in his classification, which consists of three classes of mental disorders, corresponding to these three departments of mental operation. The *second* distinction is derived from the character of the disturbance — whether it is that of exaltation or depression — of increased or diminished excitement or action.

51. Conformably with these bases of arrangement, the FIRST DIVISION consists of *disorders of passion, feelings, affections, and moral dispositions*: and presents *two forms*, viz. 1st, Of *exaltation*, or excessive intensity, giving rise to undue vehemence of feeling and morbid violence of the passions and emotions; and, 2dly, Of *depression*, or simple melancholy, or dejection without illusion of the understanding. The SECOND DIVISION comprises *disorders of the understanding or intellectual faculties*, consisting of two forms, the first of which is characterised by *exaltation*, or undue intensity of the imagination, producing mental illusions, or the several varieties

of monomania; the second, by *depression*, or feebleness of conception of ideas — by imbecility of the understanding. The Third Division consists of *disorders of the voluntary powers*, or of volition and the propensities; — the first form of which is characterised by *violence* of will and of propensity, or madness without lesion of the understanding; the second, by *weakness* or incapacity of willing, or moral imbecility. To these unmixed forms, Dr. Heinroth adds, under each division, others displaying combinations of several simple varieties. Thus, exaltation of feeling and of imagination constitutes derangement of the understanding with violent excitement or raving madness: delusion, with depression of feeling, constitutes insanity, with sorrowful dejection, or melancholy, &c.

52. M. Guislain, in his first able work on mental alienation, adopted, with very little change, the arrangement of Pinel. But in his more recent treatise, he has taken a more comprehensive and more original view of morbid mental affections, upon which he has bestowed the name *phrenopathies*, and which he has considered to proceed from an *exaltation*, or an *aberration*, or an *oppression*, or even from *exhaustion*, of the cerebral energies. These are the *four pathological conditions*, which he views as the *efficients* of mental disorders; and he arranges them as follows, — comprising, however, several affections not usually included amongst mental diseases, although sympathetically, or even more intimately, deranging the manifestations of mind: —

53. i. *Melancholia* or *Luperophrenie* (from λυπηρὸς, sad, and φρὴν, the mind), which he defines to be an exaltation of the feelings and sentiments to a state of sadness, and which he considers to exist at the commencement of almost all cases, and, with lesion of the sensibility, to constitute the fundamental character of insanity, appearing as one of the more important features of the malady. It frequently, however, assumes a monomaniacal, or, as he more correctly terms it, *monopathic*, form (from μόνος, single, and πάθος, disorder).

54. ii. *Mania*, or *Hyperphrenie* (from ὑπὲρ above, and φρὴν), which he views as a state of cerebral reaction, in which the whole or some of the active manifestations of the intellect, or traits of the character, or propensities, &c. are remarkably exaggerated and disordered. This species of insanity presents two states; — that of *erethism*, or tranquil mania; and that of *orgasm*, or furious mania. It may be partial — *monopathic*, or *monomaniacal*; or more or less general, as respects the extent to which the instinctive, intellectual, and moral powers are implicated. It may thus appear in the shape of ambitious, religious, lascivious, covetous mania, &c., assuming either a tranquil or a more or less furious character. The different forms of this species may be *associated* with *melancholia*, constituting *melancholic mania*.

55. iii. *Madness*, or *Paraphrenie* (from παρὰ, along with, and φρὴν), which he defines to be cerebral reaction characterised by fantastic aberration. This species presents numerous varieties and modifications as to the extent and association of mental disorder. But it is frequently partial or monopathic, and it may be either of a harmless or destructive nature. It is often *associated* with *melancholia*, or with *mania*, or with *both*.

56. iv. *Extasis*, or *Hyperplexie* (from ὑπὲρ, above, and πλῆξις, astonishment), which he views as sub-convulsive reaction of the cerebral power, characterised by immobility and rigidity. This state, although often monopathic, is also frequently complicated with *melancholia*, or with *mania*, or with *madness*, or with any two, or even all, of these.

57. v. *Convulsions*, or *Hyperspasmie* (from ὑπὲρ, and σπασμὸς, violent contraction). This species M. Guislain defines to be reaction, with muscular and mental agitation. He comprises under it tremor, convulsive syncope, chorea, hysteria, and epilepsy, — disorders previously not similarly classed, although either of them often *complicates* one or more of the mental disorders already enumerated, and even all of them, in rare instances.

58. vi. *Delirium*, or *Ideosynchysie* (from ἰδέα, idea, and σύγχυσις, confusion), which he states to be reaction and aberration of the ideas, wandering of the intellects, illusions, hallucinations. This may be *monopathic*, as when the patient is possessed by a single idea or illusion; or it may be *associated* with one, or more, or even with all, of the mental affections just noticed.

59. vii. *Incoherence*, or *Rêvasserie*, or *Anacoluthie* (from ἀνακόλουθια, incoherence). This state M. Guislain considers as different from delirium, inasmuch as in the latter the ideas run upon some illusion or hallucination, whereas in this state they arise vaguely, and without any connection with each other, or with any particular subject or object: nothing is expressed clearly or consecutively. In delirium, the idea, although false, presents some connection, or even the colours proper to it. Incoherence may be *monopathic* or *associated*; most frequently the latter; and the association may be with either of the preceding affections, or with several of them.

60. viii. *Dementia*, or *Noasthenie* (from νόος, intelligence, and ἀσθενία, debility). This state is viewed by M. Guislain as one of mental prostration and incapacity, in which the mental powers are palsied. This species is made to comprise those forms of insanity which consist of various grades of imbecility, original or acquired — congenital idiotcy and senile fatuity. Like the preceding species, it is either *monopathic* or *associated*, more frequently the latter, in which state it is usually the consequence of chronic or greatly prolonged forms of the disorders already enumerated.

61. I have thus fully adduced M. Guislain's arrangement of mental disorders, because it presents not merely a classification, but also an instructive analysis of them, especially when attentively considered in his own copious exposition. For practical purposes, and for the inexperienced practitioner it will be found deficient in simplicity: but coming as it does from one of the most experienced and ablest writers on mental alienation, it deserves our careful attention and our respect.

62. M. Foville, in attempting a physiological arrangement of mental disorders, observes, that *three orders* of phenomena, sensations, intellectual combinations, and movements, succeed one another in the actions of the nervous system; and that three orders of symptoms, exactly corresponding, show themselves singly or combined, in mental diseases. In founding upon the existence of the symptoms of a single one of these orders, and upon the successive appearance of those of the other two orders, he hopes to have laid, not only a physiological, but also an ana-

tomical basis of classification for the principal divisions of mental alienation, inasmuch as he thinks it may be admitted, at least with the consent of many modern writers, that sensibility, movement, and intelligence have each their distinct organic seat, although dependent upon the same system.

63. As *disorder of the intellects* is the most constant, the particular instances in which it is alone present constitutes M. Foville's *first division*, which comprehends mania, monomania, demency, and idiotcy, without complication with false perceptions, or with any disorder of the muscular system. In the *second division*, he arranges all cases characterised by the coincidence of disorder of sensation and perception with derangement of the intellects; and, in the *third division*, he comprises those which manifest that disorder of the muscular system, usually denominated general paralysis, or the palsy of the insane. In this third class he also comprehends the epileptic insane, as well as idiots, whose limbs are wasted and paralytic.

64. Dr. Prichard has distinguished insanity into — 1st, *Moral*; and, 2d, *Intellectual*: the latter he has divided into — (*a*) *Monomania*, or partial insanity; (*b*) *mania*, or raving madness; and (*c*) *Incoherence*, or dementia. *Idiotcy*, or mental deficiency, he has considered as entirely apart from, or unconnected with, any form of mental alienation.

65. Dr. Mayo, in his *Pathology of the Human Mind*, divides primary mental disease into — 1st, *Perversion*, or insanity; and, 2d, *Deficiency* of the mental manifestations. He subdivides *Perversion* of mind into — 1st, *Moral* incoherency; and, 2d, *Intellectual* incoherency: and *Deficiency* into — 1st, *Brutality*, or absence of the moral faculty; and, 2d, *Imbecility*, or intellectual deficiency.

66. I shall not notice at greater length the divisions of the various forms in which mental disorder presents itself, that have been attempted by modern writers. Enough has been advanced to show the difficulty of the attempt, and to prove even (what many would endeavour to conceal) that one form of mental disorder gradually and insensibly passes into that more nearly allied to it, not only in distinct cases, but often also in the same individual: that, for instance, partial, may rapidly pass into general, insanity; that melancholia may quickly pass into mania, or mania rapidly lapse into melancholia, or that both may very frequently alternate; and that the more simple states of intellectual disorder may be soon associated with disorder of the sensations and perceptions, or be still further complicated with lesion of the movements, in the form either of general palsy, or of epilepsy, or even of both. Nevertheless, although even the most different forms of insanity more closely approximate than is generally imagined, still it becomes necessary to preserve and to recognise such distinctions between them as really exist, inasmuch as they furnish most important indications for moral as well as for medical treatment. In the division, therefore, which I shall attempt, I shall endeavour, at the same time, to point out close relations as well as obvious distinctions; and to follow the progress of mental disorder from its more simple, partial, and common forms, up to its more general and complicated states. Conformably with this intention, I shall take a brief view — 1st, of the Partial Forms of Insanity — (*a*) as evinced chiefly in the *moral manifestations* of mind, and (*b*) as affecting principally the *understanding* or *judgment*; — 2d, of the General Forms of Insanity — (*a*) in the state of *mania*, or raving madness; (*b*) in the states of *incoherence* and *imbecility*, or dementia; (*c*) in the state of *fatuity*, or annihilation of the powers of mind; — 3d, of Complicated Insanity — the insanity being associated (*a*) with *paralysis*, (*b*) with *epilepsy*, (*c*) with *apoplexy*, &c. — Connate and Puerile Insanity — *congenital privation of mind*, or *Idiotcy*, and *Puerile Imbecility*; Puerperal Insanity — *insanity during uterogestation, after parturition, and during lactation*; and Suicidal Insanity — *or suicide in relation to insanity*; will be considered in separate chapters of this article.*

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* The following *classification* of the manifestations and affections of mind, with reference to their influence in causing mental and corporeal disorder, was published some years ago by the author. It may be found of use in considering the different forms of mental disorder, especially in relation to their arrangement, to their causation, and to their moral management. This classification of the affections of mind is based upon the relations of the human species to the rest of the animal creation, especially in respect of those manifestations which are exhibited by the higher animals. The *Instinctive Desires and Feelings* form the First Class, as being the most generally extended; and the *Intellectual States* and the *Moral Emotions* constitute the Second and Third Classes, as belonging especially to man, and as furnishing him with a numerous class of ideas, which raise him above all other animals, which ennoble him in his social and moral relations, and which enable him to derive advantages from the past, to rationally enjoy the present, and to form the liveliest hopes, and even the firmest anticipations, of the future.

CLASS I. Instinctive Desires and Feelings. — Strong and immediate incentives to action in the lower animals, but controlled by reason in man.

Order I. *Instinctive Feelings, tending to preserve the Individual.*

a. The *sensations* derived through the medium of the external senses contribute to the preservation of the individual, by showing him what is injurious, and by enabling him to supply himself with what his internal sensations or appetites indicate to be necessary to his existence. — *b.* The appetite for food and drink. — *c.* The desire of preserving the animal warmth. — *d.* The desire of repose. — *e.* The desire of place. — *f.* The desire of pleasure and the dread of pain. — *g.* The desire of continued existence.

Order 2. *Instinctive Desires tending to perpetuate the Species.*

a. Parental and filial affection. — *b.* The desires of sex. — *c.* Desire of society and social feelings, giving rise to mutual support.

The *sensations* and *desires* are most powerful incentives of volition. — The appeasing of the *desires* is necessary, not only to health, but even to existence. The inordinate gratification of them is most injurious to physical and mental health, — is amongst the most fruitful sources of disorder of both mind and body.

CLASS II. Intellectual Powers, or States of Mind.

Order 1. *Powers of Consciousness, or the simple Intellectual States of Mind.* — Injurious to health, chiefly from their injudicious or excessive exercise.

a. Perception. — *b.* Attention — effects of protracted, to a single object, or train of investigation. — *c.* Conception — accurate or inaccurate views — their effects. — *d.* Memory. This last power is more or less concerned in a large proportion of the states of mind affecting the health.

Order 2. *Powers of Intellection, or the more active Intellectual States of Mind.* — The excessive exercise or misdirection of these is more or less injurious to mental and bodily health.

a. Simple suggestion or association of ideas. — *b.* Habit. — *c.* Imagination — its activity as influenced by the moral emotions of mind, sometimes beneficial, but oftener injurious to health. — *d.* Judgment, or reasoning. — *e.* Abstraction.

Order 3. *Ideas of Reflection, springing from the Exercise of the two former Orders of Powers.* — Rational incentives to action.

67. III. Of the special Forms of Insanity.— In the above general description, I have confined myself to the more obvious and fully developed states of mental disorder. It is necessary, however, that I should consider, in a more minute, yet succinct, manner, the specific forms in which aberrations of mind present themselves in practice, and more particularly those slight, moral, and partial states of disorder, to which I have as yet very imperfectly adverted.

68. i. Partial Insanity — *the simpler forms and slighter grades of mental disorder.* — Most authors have erred in viewing the more partial, or *slighter forms* of insanity, as consisting of derangement of one, or of a few, merely, of the intellectual or moral manifestations; or of a false perception, or delusion, by which the mind is constantly haunted, whilst the other faculties are unimpaired. I have already hinted (§ 3.) at the inaccuracy of this view; and stated that, although a single faculty or manifestation may be prominently disordered, or a single train of ideas be almost exclusively entertained, the other mental faculties are never in a healthy state, or very rarely retain their former energy. Conformably with this, the term, *partial insanity,* is not so applicable to the states of disorder about to be considered, as one which would imply a *slighter grade*, or a *simpler form*, of alienation. But as the former has been already employed by recent authors; and as it may be conveniently used, as implying slightness of grade, as well as an uncertain limitation as to extent; I shall retain it, and employ it synonymously with these expressions.

69. *A.* Moral Insanity— the *Monomanie sans Délire*, or *M. instinctive,* of M. Esquirol. — This state of mental disorder may be *defined* to be *a perversion of the natural feelings, affections, inclinations, temper, habits, moral dispositions or impulses, without any illusion or hallucination, the intellectual faculties being more or less weakened or impaired.* This state has been noticed by Heinroth and Guislain, and more fully by Dr. Mayo, M. Esquirol, and Dr. Prichard, in their recent works. Its earlier or slighter grades, however, have not generally been viewed as amounting to insanity; and, indeed, unless either the disordered manifestations, which I have just enumerated as constituting it, be remarkably prominent, or the intellectual faculties be much weakened or impaired, it cannot be really considered as amounting to mental derangement. Dr. Mayo has noticed, in his *Essay on the Relation of the Theory of Morals to Insanity*, a certain variety of it as belonging to insanity, and given it the name of *Brutality*. But in a more recent work he remarks, that further consideration has satisfied him, that to class it as such is loose and unphilosophical. He considers this as a distinct form of mental disease, especially in its fully developed or strongly marked form, and to be altogether distinct from the moral symptoms of insanity that occur at an early period of the disease, and that often afford, at that time, the only clue to its existence. By *Brutality,* — by the moral disposition to which this term may be applied, — he implies a destitution of principle; by *Insanity*, a perversion of tendencies and want of self-control. In the latter case, the patient cannot hear the voice of conscience; in the former, he has no conscience to hear.

70. The moral disorder, termed brutality by Dr. Mayo, is, however, only one of the modifications of moral insanity, comprised in the more extended definition which I have attempted to assign to this species of mental derangement, agreeably with the observations of Heinroth, Guislain, and Prichard; and is one arising

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a. Mental identity. — *b.* Time. — *c.* Power. — *d.* Causation and truth. — *e.* Right and wrong. — *f.* Existence of a Deity. — *g.* Immortality of the soul. All these are seldom injurious to health, but are often beneficial in controlling the emotions and desires, in governing and directing the instinctive feelings, and in enabling the mind and body to resist the influence of injurious impressions and agents.

CLASS III. Moral Affections of Mind, *in which some of our Instinctive Feelings, as well as of our Intellectual Powers, are frequently more or less engaged.*

Order 1. *The Instinctive or simple Moral Emotions of Mind,* often sudden and violent incentives to action. When strongly excited, or much indulged, they are amongst the most influential causes of both mental and corporeal disease.

a. Anger, indignation, resentment, revenge — their effects upon health. — *b.* Sympathy — its effects. — *c.* Beauty, or deformity, — *d.* Love and hate, jealousy, domestic misery. — *e.* Pride, vanity, and humility — the liability of the former to lead to insanity. — *f.* Gladness, regret, sadness, and grief: — Grief from lost objects of affection — its effects — counteracted by progeny: — Grief from moral degradation the least supportable — why? Effects of sudden shocks of grief on sensitive minds. Disappointments of the affections: — Grief from loss of fortune, &c. Influence of repeated disappointment and losses — of harassing difficulties. — *g.* Hope and fear — their effects on health. Confidence. Various anticipations — their effects. Anxiety; — that of professions, particularly of medicine. Anticipated happiness — effects of the sudden arrest of, on sensitive minds, &c. Terror, fright, &c. — often productive of nervous diseases, and sometimes of mental disorder. — *h.* Gratitude. — *i.* Wonder. Desire of novelty. Mental languor. — *k.* Sublimity and ludicrousness. — *l* Love of approbation. — *m.* Desire of power and its related affections. Desire of Knowledge. Fame. Avarice.

Order 2. *Rational Emotions of Mind, arising out of moral and religious Obligations,* often strong incentives to action.

a. Rectitude, virtue, merit, and demerit, with all the duties we owe ourselves, as moral and responsible agents, and as tending to promote our intellectual and moral excellence and happiness. — *b.* Our various duties, as members of society. — *c.* Our religious obligations, as immortal beings. Remorse, or the consciousness of having neglected one or more of the above duties and obligations — sometimes productive of disorders of mind and body.

i. The influence of mental culture — intellectual and and moral — when duly directed in early life, upon the temperament and constitution, — upon mental and bodily health, — in developing and in strengthening both the mind and body.
ii. Temperament and constitution remarkably modify the operation of the affections of mind upon health. Illustrations.
iii. The influence of mental and bodily occupations — 1st, upon mind; 2nd, upon the body.
iv. Ill effects of want of occupation—Ennui—Hysteria—Hypochondriasis — Melancholy — Insanity — Suicide. Effects of solitary confinement.
v. Bad consequences of improper occupations and amusements, especially in females in early life. — Mental dissipation — its effects, particularly in impairing — 1st, Mental vigour; 2d, Bodily health.
vi. Consequences of habitual amusements, sensual indulgences, and pleasurable excitements, on the nervous system. These generate feelings calling for their repeated gratification, and for increased excitement, until nervous energy and vital power are exhausted, and until moral and physical ruin ensues.
vii. Good effects of a well-regulated and cheerful mind on health — of agreeable pursuits, particularly those exercising both the mind and the body. — The influence of confidence — of moderation — of contentment — and of agreeable and useful occupations, in securing both the health and happiness of their possessors.

chiefly from the unrestrained indulgence of the passions and appetites. To it, however, I shall more fully advert in the sequel. In respect of moral insanity, in its more extended signification, it is justly remarked by Dr. Prichard, that there are many persons living at large, who are affected, more or less, with this modification of mental disorder, and yet are reputed to be merely of a singular or wayward character. An attentive observer will often recognise something remarkable in their manners and habits leading to doubts of their entire sanity; and circumstances often appear which strengthen the suspicion. An hereditary tendency to madness may have existed in the family, or various members of it have been subject to diseases of the brain. The individual himself may have been the subject of an acute attack of insanity, or of inflammation of the brain, in a former period of his life; and from that time, or after having sustained some reverse of fortune, or the loss of a beloved relative, his temper and dispositions have undergone a change. This alteration of character may likewise have followed some dangerous illness or severe shock of constitution, especially fever, phrenitis, paralysis, apoplexy, or epilepsy. In some, the alteration in the temper, in the passions, the habits, or the disposition, may have been gradual or imperceptible; in others, sudden, or almost immediate upon its determining cause. In either case, it seems to have consisted chiefly of an exaltation of peculiarities or dispositions, more or less natural or habitual to the individual. In this state, a person may continue for years, following the bent of his perverse inclinations; always engaging in new pursuits, and soon relinquishing them, without any sufficient object or inducement excepting caprice. At length the total perversion of his affections, and dislike, or even enmity, to his dearest friends, excites alarm.

71. *a.* When the head of a family is affected with this ambiguous modification of insanity, it often becomes necessary, to prevent ruin from absurd extravagance or wild projects and speculations, to make some attempt at taking the management of his affairs out of his own hands; but for this the laws are inadequate, and the endeavour is often unsuccessful. Persons labouring under this disorder are capable of reasoning upon any subject within the sphere of their knowledge, and often display great ingenuity in giving reasons for their conduct, or in justifying their moral feelings. In these cases, as well as in others belonging to other modifications of this species of insanity, the feelings and passions are more or less excited, whilst the controlling faculties of reason and judgment — of attention and comparison — are equally weakened, errors in action and conduct resulting therefrom.

72. Moral insanity is not, however, limited to a preternatural excitement of the passions and temper, but comprises many other disordered states of the mind. Indeed, its varieties are almost as numerous as the modifications of disposition and temper. The most frequent forms are characterised, either by the kind of excitement just noticed, or by melancholy dejection. Either of these forms of moral disorder may continue more or less permanently; but they sometimes alternate or supersede each other, an opposite state of temper or feeling arising without any obvious cause. The prevalent character of the affection is occasionally derived from the natural disposition of the individual; but it is often remarkably different,— lively persons becoming dejected; and the melancholy or taciturn, lively, loquacious, or sanguine.

73. *b.* When *sorrow* or *gloom* is natural to an individual, and is not excessive, it does not amount to disorder; but, when it is remarkable and constant, without any real cause, it becomes a moral disease, although entirely devoid of any illusion or hallucination. Dr. Prichard remarks, that this tendency to morbid sorrow and melancholy, as it does not destroy the understanding, is often subject to control when it first arises, and probably receives a peculiar character from the previous mental state of the individual, from his education, and his religious or irreligious character. Persons of well regulated minds, when thus affected, express grief and distress at their conscious inaptitude to the active duties of life; and often feel a horror of being driven to commit suicide, or some dreadful crime to which they feel various obscure impulses or tendencies. This idea haunts them, and renders them fearful of being a moment alone. It, however, generally subsides, and a healthy state of mind returns. Persons of an opposite character frequently relapse into a state of *tædium vitæ*, or of morose disgust; loathe their very existence, and at length attempt to end it. A state of gloom and melancholy may, however, give way to a state of morbid excitement.

74. *c.* When the moral disorder is one of *unnatural excitement*, the person affected is full of projects and enterprises, or is active and boisterous, beyond the limit that belongs to a naturally lively disposition. This state of disorder may occur in persons whose temperament is the reverse of either the sanguine or lively; and it then becomes the more striking. It usually displays itself in a want of self-government, in continual excitement, an unusual expression of strong feelings, in thoughtless and extravagant conduct. A modest female becomes violent and abrupt in her manners, loquacious, impetuous, talks loudly and abusively of her friends or relations before entire strangers; or uses indecent expressions, and betrays, without reserve, unbecoming feelings and trains of thought. Persons thus affected often become drunkards; and a debauch is followed by raving madness, requiring restraint or confinement, which, with abstinence, removes, for a time, the maniacal excitement; but as soon as restraint is withdrawn, they resort to their former excesses, although well aware of the consequences. This form of the disease I have met with in two instances in professional men.

75. *d.* In examples of a different description, as Dr. Prichard remarks, the mental excitement constituting the disorder is connected with *religious feelings*, especially when the period of excitement has been preceded by one of melancholy, during which the person affected has laboured under depression and gloom, mixed with apprehensions as to his religious or future state. Formerly possessed by a dominant sense of condemnation and abandonment, when all hope and comfort have vanished, and nothing has mitigated the gloom and sorrow of the present, or allayed the dark and fearful anticipations of the future, his feelings become suddenly changed, and he

experiences a lively joy in his contemplations, amounting often to rapture and extasy. Such a change is hailed by the devout as a happy transition from religious destitution to divine acceptance and grace. But the train of excitement is too high, the expressions of happiness too extatic, to be long mistaken; pride and haughtiness, a violent or boisterous deportment, and selfishness, are soon betrayed, with want of natural affection, variability of spirits, and irregularity of mental habits and of conduct. In these cases, there is no false sensation or perception impressed upon the understanding; no illusion or belief of a particular sentence of condemnation, or message of acceptance, specifically revealed. If this existed, the case would be one, in which the moral disorder is only the consequence of a false perception or delusion, and consequently one which belongs to another species of mental disease.

76. *e.* Particular cases are marked, as noticed by PINEL, ESQUIROL, HOLLAND, and PRICHARD, by the prevalence of *certain passions* and *mental habits*, displayed under modifications, of which the human mind, in a sane state, seems hardly to be susceptible. Amongst these is an unusual prevalence of angry and malicious feelings, arising without provocation or ordinary excitement, constituting what PINEL designates, "*Manie sans Délire.*" There are many instances, observes Dr. PRICHARD, in which the whole diseased manifestation has consisted in a liability to violent fits of anger without cause, and leading to danger, or actual commission of serious injury to surrounding persons. The characteristic feature of this malady is extreme irascibility, depending on a physical morbid cause. There are other instances in which malignity has a deeper dye. The individual is continually indulging enmity and plotting mischief, and even murder, against some object of his malice. When this is connected with the false belief of some personal injury actually sustained, the case does not fall under the head of moral insanity. It involves hallucination or erroneous conviction of the understanding; but when the morbid phenomena include merely the expressions of intense malevolence, without provocation, actual or supposed, the case is strictly one of moral insanity.

77. *f.* In some instances, the *impulses* and *propensities* to which the patient is subject, or which he has indulged, are so exalted or disordered, as to constitute the sole manifestations of insanity, as ably insisted upon by REIL, HOFFBAUER, and PRICHARD. A sudden impulse to commit an atrocious act may arise in the mind of a person otherwise apparently sane, and in possession of his intellectual faculties; and be resisted by reason and self-control, on each of many occasions of its successive occurrence. At last the patient either may doubt his own powers of control, solicit the interference of his friends, and submit himself to restraint; or he may, at last, be unable to resist the impulse. In other cases, crimes have been perpetrated without any fixed object or motive, and the punishment of the law has overtaken the victim of disease. Insane persons may display their states of mental disorder by a propensity to commit every species of mischief, although devoid of any feeling of malevolence. A propensity to theft is frequently a feature, and often the characteristic one, of moral insanity. In some, it may be nothing more than eccentricity of character, as Dr. PRICHARD supposes, but it is more commonly associated with other manifestations of mental disorder, when actually amounting to moral insanity, and is to be viewed in connection with the individual's position in society, with his previous habits and character, and with the existence or non-existence of mental derangement in any member of his family.

78. *g.* *Moral Insanity* — the *Manie raisonnante* of PINEL — the *Monomanie raisonnante* of ESQUIROL — is often manifested, especially, by the singular, absurd, and exceptionable nature of the actions, intentions, and propositions of those affected by it. Persons thus disordered are turbulent, unsociable, and engaged constantly in affairs which are blameable, ridiculous, and contrary to their former habits, to their real interests, and to the interests of their families. Their moral character is altogether perverted, and they become dangerous chiefly to themselves and to those depending upon them, owing rather to the consequences, than to the nature, of the actions which they commit. Although engaged, or entering upon, what compromise their interests and character; or abandoning the objects of their affection, or quitting their families or affairs; they argue strongly in support of their conduct. Whilst there is a change or total perversion of the habits and affections, there is also sufficient power of intellect to attempt a justification of the sentiments and actions they have espoused.

79. *h.* Moral insanity has been viewed by M. ESQUIROL as presenting either an *acute*, or a *chronic* course; and he believes that it may be divided into *three stages*: — In the *first*, the character and habits are changed; in the *second*, the affections are perverted; and in the *third*, maniacal excitement, or violence of the temper or passions, with degradation of the faculties, more or less rapidly ensue. It may assume a remittent or intermittent course; and, after recovery from it, relapses are very frequent. If uncontrolled, it often passes into, or becomes complicated with, one or other, or even with more than one, of the other forms of insanity about to be distinguished, and even also with palsy.

80. *i.* The variety of insanity, termed *Senile Insanity* by Dr. BURROWS, as occurring in old age, often assumes the form of moral insanity, but more frequently that of general imbecility. In the former case, it consists in a morbid excitement of the passions, and a remarkable perversion of the temper and propensities — in a change in the whole moral character, without any hallucination or false perception, the existence of which would constitute it a different species of mental disorder.

81. A variety of instances, as Dr. PRICHARD observes, is mentioned by writers, in which the unusual intensity of particular passions or emotions has been thought to constitute mental disease, and compound epithets have been applied to these states of the mind and its affections. *Nostalgia*, and *erotomania*, have been considered as disorders of sentiment; *satyriasis*, and *nymphomania*, of the physical feelings. The excessive intensity of any passion is disorder in a moral sense. It may depend physically upon certain states of the constitution; but this does not so clearly constitute madness as the irregular and perverted manifestation of desires and aversions. This form of in-

sanity has undoubtedly been the source of moral phenomena of an anomalous and unusual kind, and of certain perversions of natural inclination, which excite the greatest disgust and abhorrence. Besides these, however, there are others, to which I may also more particularly advert, and which are noticed by M. ESQUIROL as constituting forms of monomania, under the designation of *Monomanie d'Ivresse*, of *M. incendiaire*, and of *M. homicide.* There may be doubts of the propriety of considering these, or even *erotomania*, as forms of insanity. But it is difficult, in respect of the mental manifestations, as well as of the bodily functions, to draw the line of demarcation between health and disorder; and there can be no doubt that the excessive excitement of any particular passion, sentiment, or emotion, or the undue predominance of it for an unusually long period, or the uncontrollable impulse or desire to appease or to gratify any appetite, amounts to moral disorder, which becomes the more manifest and indisputable, as it is the more freely indulged. As long as reason restrains the appetites, passions, and emotions, within the conventional limits prescribed in society, and is competent to the decided exercise of this sway, moral disorder cannot be said to exist; but when it loses this salutary influence, and in proportion as it is incompetent to exert such influence, either from the violence of passion, or the weakness of the understanding, the mental disorder is the more evident.

82. *α. Erotomania — Monomanie érotique* of ESQUIROL — is *characterised by an excessive love of some object, real or imaginary.* — It is a mental affection in which amorous ideas are as fixed and dominant, as religious ideas are in religious monomania or melancholia. Erotomania is very different from satyriasis and nymphomania. In the latter, the mischief is in the reproductive organs; in the former, it is in the mind. The one is a physical, the other a moral, disorder. Erotomania is the result of an excited imagination, unrestrained by the powers of the understanding; satyriasis and nymphomania proceed from the local irritation of the sexual organs, reacting upon the brain, and exciting the passions beyond the restraints of reason. In the former, there is neither indecency nor the want of chastity; in the latter, there is unrestrained expressions of sexual desire and excitement. The one is commonly caused by ungratified, or disappointed, affection excited in a virtuous mind; the other, by inordinate irritation or indulgence of the sexual passion.

83. In erotomania, the eyes are bright, the manner and expressions tender and passionate, and the actions free, without passing the limits of decency. Self and selfish interests are all forgotten, in the devotion paid, often in secret, to the objects of the mind's adoration. A state of extasy often occurs in the contemplation of the perfections which the imagination attaches to the subject of its admiration. The bodily functions languish during this state of moral disorder; the countenance becomes pale and depressed; the features shrunk; the body emaciated; the temper inquiet and irritable; and the mind agitated and despairing. The ideas continually revert to the loved and desired object; and opposition, or endeavours to turn them in a different direction, only render them more concentrated and determined in their devotion. At last, parents and fortune are abandoned, social ties broken asunder, and the most painful difficulties are encountered, in order to obtain the object of admiration.

84. In some cases, the attempts made by the patient to conceal and to overcome this affection, occasion a state of irritative fever, with sadness, depression, loss of appetite, emaciation, &c., which has not inappropriately been termed by LORRY *Erotic Fever;* and which, after continuing an indeterminate period, may even terminate fatally. When a young person becomes sad, absent in mind, pale and emaciated, sighs frequently, sheds tears without any obvious reason, is incapable of mental or bodily exertion, scarcely speaks to any one, loses appetite, &c., it is sufficiently evident that the mind is inordinately possessed by some desired object. If a strong effort be not made to dispossess it of the predominant sentiment, or if the object of desire be not obtained, the symptoms become still more distressing. The corporeal functions languish, the eyes sink, the pulse becomes weak and irregular, and the nights disturbed and sleepless. At last a form of slow hectic is produced; and the weaker organs, especially the lungs and heart, are the seat of slowly produced disease; the whole frame is blighted, and the patient sinks from the injurious influence of the mental affection on the vital organs.

85. This form of moral disorder may increase, and affect the intellects in a much more serious manner, until general insanity or mania is developed; and, with the progress of time, it may at last terminate in dementia or incoherent insanity. In each of these, the primary character of the disorder, or the original moral affection, will still continue to be manifested by the frequent suggestion of the same train of ideas, or recurrence to the object of devotion.

86. *β. The irresistible propensity to intoxication —Monomanie d'Ivresse* of M. ESQUIROL — may be viewed as actually constituting a variety of moral insanity, and indeed has been thus considered by the able and experienced writer just named. There can be no doubt of early advances of partial as well as of general insanity being sometimes indicated by an irresistible impulse to indulge in intoxicating liquors. And this impulse may be connected with a physical or corporeal feeling, rendering it still more irresistible, especially to persons of weak character. In many cases, indeed, the insanity is not so much caused by the intoxication, to which it is so frequently imputed, as the impulse to indulge it is a symptom of the incipient mental disorder. This is especially the case when a person, previously temperate, suddenly addicts himself to the use of intoxicating liquors, and particularly of ardent spirits. Sometimes, at the commencement of insanity, the state of the stomach, and even of the whole vital organs, is such as to be attended by an irresistible craving for stimulating fluids — by a kind of *pica*. This craving and the mental impulse accompanying it are generally suddenly developed; and occasionally, after having been appeased and gratified, they do not again return until after some time. Moreover, at this period of the mental disorder, the moral powers are weakened, and the mind altogether enfeebled and incapable of sufficiently resisting the morbid impulse, which is usually also attended by ennui, irritability, painful sense of sinking at the epigastrium, and restlessness. The desire to appease this

instinctive craving is, at last, imperative. When gratified, the patient becomes violent, maniacal, and dangerous to himself and to those around him. He continues to swallow the intoxicating fluids as long as he can procure them, or as long as he has the power of doing so, until the paroxysm terminates. As the patient becomes sober, the maniacal turbulence often subsides, but it frequently continues for some time afterwards, often for many days, with signs of more or less vascular excitement of the brain and its membranes; and, in many cases, when he can revert to the means of intoxication as he becomes partially sober, the insane violence is very considerably prolonged. At last the paroxysm terminates, and the craving for exciting liquors is no longer felt. Instances have even occurred of these liquors being afterwards loathed, until another paroxysm took place. M. ESQUIROL met with a case of mania consequent upon intoxication, which was followed by a distaste of all fermented and distilled liquors for ten years afterwards. Some persons, unable to withstand the impulse to intoxication occasioning fits of insanity, have solicited the restraint of friends; and others have committed suicide when they found themselves unable to resist the morbid impulse.

87. This state of moral disorder, whilst it gives rise to fits of maniacal excitement, aften also occasions more permanent mania, and even dementia. The maniacal paroxysms, when thus excited in females, are frequently associated with hysterical symptoms; and when mania or dementia is consequent upon it, palsy is not an infrequent complication.

88. *γ. Incendiarism is sometimes an act of partial insanity — Monomanie incendiaire* of ESQUIROL — *Pyromanie* of MARC. (*Ann. d'Hygiène*, t. x. Paris, 1833.) — It is, however, more generally one only of the modes in which an evil or mischievous propensity manifests itself, when excited by envy, jealousy, or revenge, in the minds of persons unrestrained by reason and by the laws. Yet instances are recorded by HENKE, ESQUIROL, MARC, and others, of persons being impelled to the commission of this act by an irresistible impulse, which their will was incapable of overcoming. Most of these cases have occurred in girls and young women, who were either pregnant, or disordered in the uterine functions. Several of them presented signs of increased determination of blood to the brain; and some manifested other signs of insanity, either with, or without, illusions or false perceptions. M. ESQUIROL concludes, from the history of cases of this kind, observed in France and Germany—1st, That mental alienation, whatever may be the character of the delirium, determines some insane persons to commit incendiarism; and, 2dly, That there is a variety of monomania without delirium (without hallucination) characterised by an instinctive impression — an uncontrollable impulse — to commit this crime.

89. *δ. Homicidal Insanity — Monomanie homicide*, ESQUIROL — *Fureur maniaque*, FODÉRÉ — *Manie sans Délire*, PINEL. — Murder, or attempts to murder, are made by insane persons — 1st, When impelled by an involuntary impulse, or instinctive desire, which they are unable to resist; 2dly, When actuated by motives on which they are capable of reasoning, and whilst conscious of the evil they have committed; 3dly, When influenced by illusions, hallucinations, or false perceptions; 4thly, When excited by passion or opposition; 5thly, When they believe that they are opposing an enemy, against whom they should defend themselves; and, 6thly, When the intelligence is so prostrate as to be incapable of distinguishing right and wrong, and when they act from imitation. It is respecting the *first* and *second* of these — the former especially — that I now proceed to offer a few remarks.

90. Persons who appear to enjoy reason, but whose active moral powers — whose affective functions of mind, in the language of French pathologists — are disordered, must, conformably with what I have advanced, be viewed as insane. These persons perceive, compare, reason, and judge correctly of matters, but they are influenced by the least cause, or even without any object, to acts of violence. They are irresistibly, or instinctively, impelled, with a full consciousness of their state, to commit the crime they most hate. They deplore their situation, and give warning to guard against their fury, or to deprive them of the power of committing the dreaded act.

91. But the question has been long since and often proposed — Is there really a form of insanity in which a person may enjoy reason unimpaired, and yet commit the greatest of crimes? M. ESQUIROL formerly answered this in the negative; and stated, that of the partially insane, who appear to enjoy their reason, and to deplore the determinations by which they are so strongly impelled, all admit that they have felt something internally or mentally at this time, of which they could give no clear account; that their brains were embarrassed; that they experienced more or less difficulty — often an inexpressible difficulty — in the exercise of their judgment; and that this was preceded by physical symptoms which they perfectly recollected. One felt a burning heat or a pulsation in the head; another, a lacerating or a sharp or acute sensation rising from the abdomen to the interior of the cranium; a third, a momentary illusion or hallucination; or a fourth was betrayed by an erroneous process of reasoning. One person suddenly becomes red in the face, imagines he hears a voice addressing him, and acts according to the injunction he believes imposed on him, or to the call addressed to him. A husband is persuaded that his wife is unfaithful to him; and, although every circumstance is considered by him, and found to militate against the truth of the persuasion, yet, in a moment when the jealous feeling gains the ascendancy, an act of murder is committed. The mother of a family believes that her situation is distressing, and that her children will be reduced to mendicity. In a fit of despair she forms the resolution of destroying them, in order to preserve them from a calamity which she considers greater than death; but in the moment of her attempting it, maternal tenderness, speaking louder than despair, exclaims, "Protect my children from me!"

92. All these instances may be referred to a momentary delusion or hallucination, under the influence of which crimes or insane actions may be committed, after which a lucid period occurs. But there are other instances which cannot be thus explained, and which do not altogether warrant the conclusion at which M. ESQUIROL arrived in his earlier work; and of this he is aware in his more recent production, for he there admits that,

although partially insane persons are often betrayed by their delirium or their hallucinations into the commission of homicide, yet there are others who commit the crime from an instinctive or irresistible impulse. In the former class of insane homicides, the understanding is disordered, under the influence of false perception, or of a delusion momentarily entertained, and the insane person acts under an error of judgment; but, in the latter class, reasoning and judgment are altogether suspended, and the insane impulse impels and directs the will, without any effort of the understanding or of the moral powers to prevent the act. An individual thus affected acts uninfluenced by delirium, or delusion, or emotion, or passion, and almost without consciousness, impelled by an instantaneous, blind impulse, independent of the will, and before which reason and judgment are for a moment entirely prostrate. This constitutes the paroxysm of monomania without delirium of the French writers. Of this affection I have met with three instances. In two of these, however, there was more or less disorder of the digestive organs; and in the third, a female, the catamenia were disordered; but there was no other indication besides this of mental alienation. This subject is most important, and is, moreover, very intimately related to *suicide*, inasmuch as the morbid impulse to destroy one's self is similarly manifested, as will be shown in the sequel, and much more frequently than the impulse to destroy another. Yet has it been nearly overlooked by most writers, and especially by those of this country, notwithstanding the growing increase of both crimes, and the evidence furnished, by a careful inquiry into their remote causes, of a progressive increase of them being likely to result. Homicidal monomania most frequently occurs in persons of a sombre, melancholic, or capricious disposition; but it is also met with in those who are remarkable for the amiability of their tempers and manners. The state of the atmosphere, disorder of the digestive and excreting organs, excitement of the nervous system, a vicious education, the reading improper books, and accounts of crimes, suicides, &c., unsound and exalted religious sentiments, the influence of imitation, chagrin and disappointment, want, &c., are chiefly concerned in developing this moral distemper. A very few instances from among many will illustrate this state.

93. The mother of four children was suddenly seized with the desire of killing them, and flew from her house as the only way of preventing the commission of the act. A maid, on each occasion of her dressing the infant committed to her care, was seized with an uncontrollable desire to murder it. A man experienced repeated impulses to murder his wife, to whom he was warmly attached, and was prevented on one occasion from attempting it by an accidental occurrence. He applied to the author for advice, and to be placed under restraint. He was at that time apparently well, and capable of pursuing his usual avocations. A person, after reading the horrible details of a murder, which was circumstantially narrated by the daily and weekly caterers to the most depraved passions of the multitude, was suddenly seized with an impulse to kill his wife. It has been observed in France, in Germany, and in England, that the publicity given to the particulars connected with a murder has been followed, within a few days, by several attempts to commit this crime.

94. Although various moral causes combine, in some cases, to predispose the mind to be influenced by the insane impulse to perpetrate this and other crimes, yet it will be found, in most, if not in all, instances, that the person thus *morally* affected is also *physically* disordered, if the examination be made with sufficient care, and with the requisite knowledge of the several manifestations of gradual and insidious disease of the brain and of the abdominal organs. A most attentive examination of the various functions of the brain and of the senses connected with it — of the temperature and circulation of the head — of the functions of those viscera which most readily sympathise with the brain, and which so powerfully influence both its actions and its circulation, and even of the appearances of the tongue, and of the several excretions — will generally disclose more or less disorder in one or more of these quarters, and prove, that although there may not be very obvious disease, there is lurking mischief, either primarily or consecutively, but always most seriously, affecting the brain. In the slighter and more incipient states of morbid action in this organ, the general and local sensibility and the circulation often betray little or no disturbance, and indeed the whole amount of physical disorder may be so small as to escape the detection of all, excepting the closest observer, who, from experience, will look for it, and detect it, more readily in the sympathies, and in the symptomatic affections, of remote parts, than in disorders of more closely related organs. It is reasonable to infer, that when capillary action in the brain is slightly but very generally disordered, and especially when this disorder commences gradually, and almost imperceptibly, and proceeds slowly and insidiously, those manifestations of mind which are of the highest order in the scale of mental development will be the earliest and most seriously deranged; and that, as the physical disorder proceeds or extends, the other orders of mental operation — the *intellectual* and the instinctive (see *Classification* at § 66.) — will become successively implicated, until the various phases of moral and intellectual insanity are passed through, and instinctive insanity, or fatuity, is ultimately reached.

95. *B.* PARTIAL DISORDER OF THE UNDERSTANDING — *Amenomania* of RUSH — *Monomania* of ESQUIROL — *is characterised by false perceptions, illusions, or erroneous convictions, referring to one or a few subjects merely, or involving chiefly a single train of ideas, and so impressing the mind as to partially disorder the judgment.* Partial insanity of the understanding may exist — 1st, *In a more or less simple form*; or, 2dly, *Associated, or complicated, with moral insanity.* Indeed, most of the instances in which crimes are committed in the insane state present this latter form. Even the more simple states of monomania of the understanding may be said to be insanity with reference to a small number of subjects, rather than to one subject only; since the number of persons who are insane upon a single subject merely is comparatively few. Most of the cases usually denominated monomaniacal are those which present some predominant idea, or hallu-

cination, amidst other indications of mental weakness or disorder, as I have already contended (§ 68.).

96. This species of insanity was distinguished by the term *melancholia*, from the age of HIPPOCRATES, till M. ESQUIROL imposed upon it the name of *monomania*. As the former expression suggested the idea that partial derangement of the understanding is essentially connected with sadness and despondency, and as this is not the case, the latter term is much less exceptionable, although not always strictly applicable, for the reason just assigned. The expression, therefore, which I have made use of at the commencement of this section is more applicable to the different states of this species of derangement, than any single word that can be employed. Although the illusions which possess the minds of persons partially insane are as varied as the operations of the intellect, yet they very frequently are productive of either happiness or distress to the patient. Hence they admit of being divided into those which are pleasurable or exciting, and those which are gloomy or depressing, — a division, indeed, which has been adopted by RUSH and ESQUIROL. Still there are some predominant ideas, which do not necessarily produce either happiness or misery, but which may be contingently associated with either, or with each alternately. Indeed, many persons become insane upon some metaphysical or abstract subject, on which they talk absurdly, but without any disposition to grief or to elevation of mind. It should also be remarked, that M. ESQUIROL has comprised under monomania those states of moral disorder already noticed, and which have been excluded by Dr. PRICHARD, under the belief that they are unconnected with any illusion or hallucination. But, as I have already contended, the judgment is more or less impaired in these states of moral disorder, although not to such an extent, or in such a way, as to give rise to a precise morbid perception, or perversion of the understanding; and self-control is remarkably weakened.

97. The forms of partial insanity of the understanding have been distributed into many orders or kinds. The subdivisions would be endless, if it extended to as many different kinds as there are modes or varieties of hallucination; at most a division can be founded upon the prevailing passions or emotions, which give origin, and impart their peculiar character, to the disorder; but even this would be too extended. It might, therefore, be sufficient to arrange them into —1st, Those characterised by exaltation or excitement; and, 2dly, Those evincing more or less depression. This arrangement, however, would exclude more than one of the varieties of mental disorder which fall under the present head, or of those hallucinations which are not necessarily connected with either exaltation or despondency, and which yet may be attended by either. It will be preferable, therefore, after having taken a general view of this species of insanity, to notice more particularly the chief forms which it most frequently assumes.

98. *a*. GENERAL VIEW OF PARTIAL INSANITY. — The remark already made (§ 68.) as to moral insanity, is also applicable, and even more so, to partial disorder of the understanding; and this is, that the mind is not perfectly sound on subjects unconnected with the particular impression by which it is possessed and more prominently disordered. There are certainly cases in which the understanding seems quite rational on all topics, excepting those connected with its illusion or hallucination; but, even in these, it will be found, on closer observation, more or less weakened or impaired, owing to deficient powers of attention and comparison. The individual affected is certainly, in ordinary circumstances, calm, and devoid of those signs of perturbation and constant excitement characterising mania, or raving madness. But it will be found, that his habits and disposition have been long more or less changed; that he has presented a greater or less degree of moral insanity; that his powers of application and attention have been weakened for some time; and that an erroneous belief or illusion has gradually arisen in the course of these disorders. Very frequently a settled or habitual despondency, or melancholy, or moroseness of temper, or even a sullen misanthropy, has existed, has slowly increased, and has disordered and perverted his feelings and affections. Ultimately some delusion supervenes, which may at first be fugitive, but which afterwards becomes more fixed and constant.

99. *a*. Dr. HOLLAND very justly remarks, respecting the commencement of the slighter forms of partial disorder of the understanding, that many persons have felt, at one time or other (oftenest, perhaps, during the "severa silentia noctis"), some dominant idea or feeling to possess the fancy, retaining its hold with a sort of malignant power, despite all efforts to shake it off; and, by degrees, distorting the subject, especially if it be a painful one, into a thousand false and alarming forms. If this train of thought be interrupted, and time, society, and other objects, come in between, the mind is conscious of passing, as out of a bad dream which for a while had overshadowed it. But let there be a cause for the continuance of this state, and we have an approach to monomania in some of its various shapes; nothing apparently wanting but the intensity, which is often so singularly testified in these cases by the actions induced, and by the long duration of the delusion. PINEL mentions instances where the same single insane impression continued without change for twenty or thirty years.

100. The illusion which torments the monomaniac is generally something bearing a near relation to his former habits of business, or to the usual occupation of his thoughts. In fact, the long persistence of the mind in one idea or feeling, not duly broken in upon, or blended with others, is, as Dr. HOLLAND well remarks, a state always leading towards aberration. Indeed, the common, and often the only, evidence of insanity, especially in its earlier stages, is that drawn from the dominance of a single impression, faulty, perhaps, only in the absence of those which should modify and correct it. It may be alleged, that this reasoning tends to remove all distinction betwixt the sound and unsound mind, and to reflect madness back, as it were, upon the healthy and natural state of the faculties of man. But this is not truly so. The extremes are widely apart, and are readily recognised. It is only in the slighter states of divergence, where mental health is lapsing into disorder, that marks of practical

distinction may be difficult, or misunderstood. The existence of more doubtful cases, graduating between reason and insanity, is but a part of that law of continuity, which pervades both the moral and the physical world; and which, although furnishing difficulty to the legal consideration of insanity, yet should present but little to the adoption of appropriate moral and medical treatment.

101. It is often difficult to account for the occurrence of the hallucination disordering the understanding. But, as just observed, the illusion entertained is generally connected with the former habits, business, and opinions of the patient. Dr. PRICHARD remarks, that an individual of a melancholic temperament, long influenced by circumstances impairing his health and calling into play the morbid tendencies of his constitution, sustains some unexpected misfortune, or experiences great anxiety, becomes despondent, and broods over his feelings, till the prospects of life appear to him dark and distressing. His inclinations now are so altered, that no motive can rouse him to exertion; his gloom and despondency increase; his imagination fixes upon some particular circumstance of a distressing nature, and this becomes afterwards the focus round which the feelings which harass him concentrate themselves. This circumstance is often some real, occasionally some trifling, act of delinquency, for which the patient expresses the strongest, and perhaps disproportionate, self-condemnation. In other instances, an unusual phantom suggests itself, in harmony with the prevalent tone of the feelings; and this at first haunts the mind as possible, and is at length admitted as reality. Some individuals begin by indulging morose or malignant feelings to their acquaintance; and, by magnifying in imagination every trifling neglect into a grievous contumely, they fancy at length that they find, in some casual occurrence, glaring proofs of premeditated designs to ruin them and expose them to the contempt of society. The disease in these cases has its real commencement long before the period when the particular delusion, which is only an accessory symptom, is discovered, and even before it became impressed on the imagination.

102. *β*. An undue indulgence in a single train of thought of any kind, particularly when involving any moral emotion, may lead to partial insanity, especially when the individual is physically disordered, or is out of health — when his digestive, assimilating, and excreting functions are deranged, and his nervous energies are weakened; and this is the more likely to occur, if his intellectual and moral powers have been imperfectly or improperly cultivated in early life. In these cases, the insanity is gradually developed, or in a similar manner to that now described: in some it is the consequence of excessive devotion to a particular department of abstruse investigation — of exertion beyond the natural energy of the mind in one particular direction, and to the exclusion of countervailing healthful occupations of the intellectual and moral faculties, and of requisite relaxation of mind; in others, it gradually arises out of the habitual indulgence of some moral emotion or sentiment, or of some more violent passion, intellectual energy becoming impaired, and at length more obviously disordered. In many instances of this kind, as well as of the preceding, the insane delusion is occasioned chiefly by fears, anxieties, expectations, and excitements, of either a religious, a political, or a domestic nature, or even by the terrors produced in weak and susceptible minds by the vehement language and denunciations of popular and other preachers. The following case adduced by Dr. PRICHARD illustrates the connection of the hallucination with previous occupations, and with the moral influences to which his mind was subjected. A young man, whose father was frequently employed in criminal prosecutions, had assiduously attended the sermons of a preacher noted for the vehemence of his exhortations, and had devoted himself, to the neglect of sleep and bodily exercise, to studies, for which he was unprepared. He became depressed in spirits, and disordered both in mind and in body. The morbid feelings which afflicted him at length conjured up an imaginary cause for themselves, that soon became indelibly impressed on his belief. He fancied himself suspected of some horrible crime, for which a process had commenced against him; and, whenever the door of his room was opened, he supposed that officers of justice were coming to apprehend him.

103. It is unnecessary to adduce instances in proof of the position already stated, that the erroneous belief or delusion, constituting partial disorder of the understanding, is generally, or at least frequently, consequent upon, and afterwards associated with, previously existing moral insanity. Whether this connection exists so universally as Dr. PRICHARD believes, I will not assert; but it doubtless may be traced in the great majority of cases. It will further appear from what I have next to adduce, that the illusion is generally some notion as to the powers, property, or destination of the person affected, engrafted upon his habitual state of desire or aversion, passion or sentiment — or an erroneous idea or belief arising out of morbid sensations, which the imagination, influenced by predominant feelings, emotions, passions, or trains of thought, converts into diversified shapes; and that the illusion consequently assumes a character and form, more or less obviously moulded by such feelings and trains of thought.

104. *b*. HYPOCHONDRIACAL MONOMANIA. — *When the fears, apprehensions, and despondency of an individual are concentrated on his bodily feelings, relate to some disorder by which he is affected, and which he exaggerates, and are connected with an erroneous belief, or hallucination*, a state of disorder exists, which may be aptly termed *hypochondriacal monomania, or hypochondriacal disorder of the understanding*. The mental affection here gradually supervenes in the course of the bodily disorder. — The *first stage* of the malady is *hypochondriasis*, and does not, as I have contended (see the article, § 19.), amount to insanity, until the hallucination is manifested. It is true, that it is on the verge of insanity, — that it is closely allied to it, — and that it may be viewed, in its more fully developed states, as a variety of moral insanity; but still, until an erroneous belief is entertained, the mere exaggeration of bodily ailments, and the apprehensions, despondency, and concentration of the attention towards them, do not constitute, especially in the eye of the law, a true form of mental derangement. In the great majority of

instances, the hypochondriacal affection does not pass into, or occasion, an insane delusion; but when this change has taken place, and when a man fancies that his head is too large to enter in at the door, that his legs are made of clay, or that he has a fish or a demon in his stomach, the nature of the disease is different, and in no respect doubtful.

105. A flatulent hypochondriac may ultimately suppose that a living creature or a demon, according as he may be influenced by religious or superstitious ideas, is actually lodged in his abdomen. Dr. Jacobi (*Samml. f. d. Werk. der Gemüthekrankheiten.* Elberj. 1822, p. 21.) mentions the case of a man, quiet and rational on other topics, who entertained the notion that there was a person concealed in his belly, with whom he held conversations. He often perceived the absurdity of this idea, and grieved in acknowledging and reflecting that he was under the influence of it, but yet could never get rid of it. An attempt was made to cure this man by applying a large blister on his abdomen, and, when it was dressed, and the vesicated skin snipped, by throwing from behind him a dressed-up figure, as if just extracted from his body. The patient at first believed in the success of the performance, and was joyful in the full persuasion that he was cured; but some morbid sensation about the bowels, which he had associated with the insane impression, being again experienced, he took up the idea that another person similar to the first was still left within him.

106. *c.* Melancholic Monomania — *Melancholia* of authors — *Lypémanie* of Esquirol — *Tristimania* of Rush — *Melancholia with delirium* of Pinel — *is characterised by sadness and despondency, the mind being given up to fears and anticipations of evil, to an erroneous belief or impression, concerning one subject, or a particular series of subjects.* — Authors since Hippocrates have applied the term melancholia to delusions characterised by sadness and despondency; and this form of insanity was, according to Galen, so denominated, because all the sad or desponding moral affections depended upon a depravation of bile, which had become black, and obscured and disordered the animal spirits. Cælius Aurelianus and most of the ancient writers did not distinguish between melancholia and hypochondriasis; and even the authors of the 15th, 16th, and 17th centuries continued to confound them, although various relations between melancholia and other affections of the mind were distinctly pointed out by them. M. de Héréda and Forestus first noticed the connection of gloomy ideas and despondency with a partial delirium, or delusion, in this malady; and Sennert considered that the insane delusion was consequent upon despondency. Hoffmann and Boerhaave marked the relation between melancholia and mania, and the frequent origin of the latter in the former, — thus regarding melancholia as a slighter grade or earlier stage of mania. Sauvages defined melancholia to be a partial or exclusive delirium, without furor or excitement, associated with a chronic disease. Cullen was among the first who took a correct view of this malady, and who carefully distinguished it from hypochondriasis; but it is chiefly to Pinel, Esquirol, and Guislain, that we are indebted for accurate ideas as to its nature and relations.

107. *a.* Most writers have been more particular in their descriptions of the fully developed state of melancholia, than in pointing out the origin and rise of the malady, the importance of which is by no means small; and have overlooked the commencement of it in the moral disorder already noticed. M. Guislain and Dr. Prichard have, however, remarked the absence of delusion in the more simple and early forms of the complaint. M. Guislain observes, that there are melancholics without delirium or hallucination, as well as maniacs without any remarkable disorder of the intelligence, and these exhibit the most simple form of the distemper. Such persons are sad, depressed, despondent, &c.; but evince no remarkable aberration of the imagination, of the judgment, or of the intelligence. In this stage or state of disorder there exists only a form of moral derangement, which may proceed no further. But when erroneous notions or delusions, or a disposition to entertain an idea of suicide, or attempts to commit it, are manifested; or when any unusual or irrational determination is shown; then the disorder is no longer simple, but is fully developed and established, and actively influences the will.

108. In this state the patient is quite cognisant of what takes place around him; he appreciates more or less his situation, and recognises his friends and enemies; but fear, despair, or despondency, govern him — he is absorbed by the painful sentiment. Overwhelmed by it, prostrated, lying on his bed, or sitting with clasped hands, his head bent forwards, his eyes obliquely fixed on their object, he presents the very image of sadness. His voice is low; his expressions and acts are slow, prudent, and distrustful; he answers only in monosyllables; seeks solitude, and is reserved. His countenance is pale or sallow; his features are altered; his brow more furrowed; and he appears older than he is. He often complains of a sense of weight in his head, and sometimes of a void or of a feeling of emptiness in his cranium, occasionally with uneasy sensations or pains in the scalp. His repose is unsound — his senses only being asleep, while his mind is awake; and he complains of not enjoying an hour of sound repose; but occasionally he is somnolent. He is kept awake by his fears, jealousy, or illusions; and when he dozes, he is terrified by phantoms and frightful dreams. One, after having passed a good night, is more depressed and unquiet. Another believes that he will not get over the day, and yet feels better as the night approaches; and a third has his inquietude increased at night, dreading the solitude, the obscurity, the sleeplessness, the frightful dreams and phantoms attending every attempt to get rest.

109. Some refuse for several days all kinds of nourishment, restrained by illusions or hallucinations which increase their chimerical fears. Some dread poison, dishonour, &c.; and others abstain from food, in order to escape from a wretched existence, or to do penance for a supposed crime. The sensibility of some is acute, and the slightest occurrences produce the most vivid impressions. Heat, cold, rain, wind, light, noise, and all physical agents affect them inordinately. If there be the slightest cause of fear, they are terrified; if there be the least cause of regret, they are in despair; if they suffer the smallest reverse or disappointment, they be-

lieve themselves ruined. Their nervous system is morbidly susceptible, and their moral emotions, especially those of a gloomy kind, are remarkably exaggerated. They are physically and morally susceptible; and yet their sensibility is concentrated upon one object, or train of ideas. So complete is the concentration of their feelings, that they are almost inaccessible to impressions unconnected with the subject of their melancholy; a moral abyss separates them from all objects and sentiments that present no relation to their fears or delusions.

110. Anxieties and fears respecting any matter, and all the depressing passions, particularly when long indulged, or frequently reiterated, sway the intellect and judgment, and originate thoughts the most opposed to the dictates of common sense. These may ultimately pass into false perceptions and hallucinations, which will further increase the unjust inferences, the morbid belief, the unfounded fears, and the terrors already entertained. Fear, in all its forms, whether proceeding from a real or an imagined cause, exercises a dominant influence on the melancholic. A person whose fears have been excited by denunciations against religion, becomes, under the influence of these fears, anxious and depressed; his sentiments and power of attention are concentrated upon the object of his insanity; his fears exaggerate their causes, as well as the consequences which these causes may produce; and at length delusions are generated and entertained, influencing not only his thoughts, but also his actions. The victim of fanaticism or superstition may thus ultimately believe himself to be pursued by the vengeance of Heaven; or he may become the prey of anxieties, as to his state, so intolerable as to lead him to prefer death to incertitude. He who has offended the laws, continually apprehends the officers of justice; and, at last, believes himself in their power. Another, who has long dreaded the wickedness of man, ultimately believes that some one threatens his fortune, his honour, or his life; the least noise, sign, or doubtful word, exciting and confirming his fears or his belief. Some are afraid of every thing, and are subject to perpetual anxiety, or are terrified by a vague sentiment, without motive or object. Their expressions, attitudes, actions, and discourse, express extreme fear, which they cannot overcome, and which they cannot explain, or account for.

111. The delusion of the melancholic derives its character from the moral affection which preoccupied the mind on the appearance of the malady. A merchant has experienced losses of little moment, and he believes himself ruined, notwithstanding demonstration to the contrary; two brothers have had a dispute, and one becomes persuaded that the other has an intention to murder him, to obtain his property. Frequently, some one of the moral sentiments of the melancholic is so remarkably exaggerated, as to predominate over every other consideration, and to give rise to acts of despair. Many of the murders committed during this malady are the result of this morbid state of feeling. A mother abandoned by her husband attempts to destroy her children, to prevent a similar misfortune; and a religious enthusiast kills his infants, to send them to heaven before their minds are corrupted.

112. Some melancholic persons are conscious of the absurdity and the falsity of the fears by which they are tormented. They reason respecting them, and even are distressed at being the victims of their apprehensions; but still they continue a prey to them, and they find it impossible to think or act otherwise than under this dominion. An insurmountable power governs their reason, and they believe that the Almighty, or some demon, or fate, or some other power, influences them. The will of the hypochondriac is inflexible. No consideration or sentiment can overcome his alarms and errors, or his aversions.

113. *β*. The *physical symptoms* of melancholia vary much in different persons, and even in the same person in different periods of the disease. The patient sometimes has a sense of constriction in the chest, and places his hand over the heart, complaining of anxiety and oppression, or of pain in that organ. The pulse is more frequently slow, than natural or accelerated. The tongue is often loaded, the appetite is impaired, the bowels costive, and the whole series of digestive functions more or less deranged. The urine is often pale and abundant.

114. *γ*. The *Diagnosis* of melancholia from hypochondriasis becomes a matter of some importance, seeing that they have been confounded by the older writers, and that the one may be mistaken for the other. Melancholia is more commonly hereditary than hypochondriasis, depending upon the melancholic temperament, which predisposes to the operation of the exciting causes, especially errors in education, and other influences acting directly on the brain, the sensibility, and the understanding. The causes which produce it are more generally moral; whilst hypochondriasis more commonly proceeds from causes which are physical, and which modify the functions of the stomach and other digestive organs. In melancholia there is a fixed delusion or insane idea, which is entertained with sadness and despondency, and a vicious association of ideas. In hypochondriasis, on the contrary, there is no insane delusion, until the disease passes into melancholia; but the patient exaggerates his sufferings — his mind is continually occupied with his ailments, which he believes to threaten his life — and he is continually subject to dyspepsia and other disorders of the digestive functions. — See article HYPOCHONDRIASIS (§ 19.).

115. *δ*. The *Causes* of this species of insanity are — the melancholic temperament, hereditary conformation or constitution, moral susceptibility, and increased sensibility; sudden shocks, reverses, disappointments, anxiety of mind, and all the depressing sentiments; frights, terror, fear; losses of fortune or of friends and connections; political reverses, and changes, and revolutions; fanaticism, superstition, and unsound views of religion; wounded self-love, humiliating circumstances or occurrences; masturbation, and whatever causes physical and moral exhaustion; and injuries of the head. — The *pathological* causes are chiefly — the suppression of accustomed discharges, protracted indigestion; and hypochondriasis, diseases of the heart, and of the digestive organs, obstructions of the liver and mesenteric glands, diseases of the uterus, &c. Most of these, however, are rather coincident disorders, than influential agents in the production of the mental affection.

116. M. ESQUIROL states, that of 482 cases of melancholia, the chief causes were—hereditary pre-

disposition, in 110; domestic unhappiness, in 60; reverses of fortune and distress, in 48; disappointed affection, in 42; the critical period of life, in 40; the puerperal state, in 35; venereal excesses, in 30; suppressed menstruation, in 25; intemperance in wine, in 19; frights, in 19; anger, in 18; wounded self-love, in 12; injuries of the head, in 10; jealousy, in 8; and masturbation, in 6. It is obvious, however, that this is only an approximation to accuracy, as, in many cases, several causes have concurred in producing the disease.

117. ε. The *course* of melancholia is usually continued, but is sometimes remittent, or even intermittent, or recurrent. It has even been observed to have been periodic. — Its *duration* is most variable. When it terminates in health, the change generally takes place between the third and the thirteenth months, — six months being about the average duration of these cases. Although there is so little moral reaction in this species of insanity, yet it is amongst those from which recovery most frequently takes place. A favourable change has been observed to follow the occurrence of a natural evacuation, especially when that has been suppressed, as the menstrual and hæmorrhoidal discharges, &c. It has also disappeared after the breaking out of boils and cutaneous diseases. The occurrence of hæmoptysis, of tubercular consumption, and of asthma, has sometimes been observed to dissipate an attack of melancholia; but the patient has died of the consecutive malady.

118. On the other hand, various organic lesions often appear in the course of melancholia, and are to be viewed rather as being favoured by it, than as accidental occurrences. Certain of them, indeed, have been considered as concerned in the production of the mental disorder; but it is much more probable, that the physical and moral changes are the results of the state of organic nervous influence, although the physical may augment the moral, and *vice versâ*, — the one acting and reacting on the other.

119. ζ. The *visceral diseases* most commonly observed in the course of melancholia, or in fatal cases of it, are tubercular and other organic lesions of the lungs, chronic pleuritis, enlargements and engorgements of the liver, alterations of the heart and spleen, and various displacements of the colon, particularly the descent of the transverse arch. This last change was first insisted on by M. Esquirol; and has been observed in melancholia by Bergman, Wichmann, Hesselbach, Guislain, Müller, Annesley, and myself. The transverse arch is sometimes displaced obliquely, so that its left flexure is carried downwards behind the pubis, and it occasionally descends perpendicularly, in a loop or duplicature, as far as the pelvic cavity. Displacements of this viscus are observed also in other forms of insanity, but not so frequently as in melancholia. M. Esquirol considers that organic lesions of the brain are not frequent in this species of the disease; the number of cases in which changes were observed by him in this part being much smaller than observed by M. Foville and others, who have more justly appreciated the minute alterations which take place in it during mental disorders. M. Esquirol confirms the remark of Lorry and Mead, that tubercular phthisis is the most frequent cause of death in melancholia, and subjoins the following enumeration of the organic lesions found in 168 cases: — *Within the cranium* — thickening of the membranes, 2; organic alterations of the substance of the brain, 4; ossific deposits in the falx, 3; effusions of blood in the brain, 5. *In the chest* — organic lesions of the lungs, 65; disease of the heart, 11; effusion into the thoracic cavities, 6. *In the abdomen* — displacement of the colon, 33; adhesions and suppurations of the peritoneum, 5; ulceration in the stomach or pylorus, 6; ulceration in the intestines and rectum, 7; intestinal worms, 5; tænia, 1; organic lesion of the liver, 2; biliary concretions, 7; ulceration in the uterus, 6.

120. η. Melancholic monomania may *pass into*, or become *associated with*, some one of the other varieties of insanity, or even with more than one of them. It occasionally passes into mania, and even degenerates into dementia. In this state the patient retains the predominant ideas; but these are incoherent, without order, and do not harmonise with the actions; whilst previously the ideas were strong and fixed, and the determinations of the will were the immediate results of the characteristic delusion and trains of thought.

121. δ. Demonomania. — The Chaldeans, the Phœnicians, the Jews, and the Greeks believed that most diseases, particularly those of the brain and mind, proceeded from demons or evil spirits. Job was said to have been the victim of a demon; and Saul to have been under the influence of an evil spirit. Aristophanes termed the highest grade of madness, not *μανία*, but *κακοδαιμονία*. Herodotus was, however, nearer the truth, when he said that Cleomenes had become mad from intoxication among the Scythians, and not by the presence of a demon. M. Esquirol has, conformably with the original acceptation of the word, comprised the two varieties of partial insanity about to be noticed, under the appellation of *Demonomania*. The first of these varieties, or *Theomania*, is still of frequent occurrence; the second, or *Cacodemonia*, was common in ancient times and during the prevalence of popish superstition; and, indeed, still frequently occurs in countries where superstition lingers.

122. α. The *Theomaniac* is characterised by an enthusiastic belief in divine selection and acceptance, and in the future eternal damnation of all who do not think, as to religious matters, exactly as he does; by a belief of having received revelations from the Almighty, or of being inspired, or of holding communications with the Holy Spirit, or with angels or saints; or by a belief of having received a mission from Heaven to convert sinful men. Persons who have had their minds inordinately excited by preachers who are themselves thus affected, or who are noted for the vehemence of their language, and by the enthusiasm of their belief in the more alarming or exciting topics of religion; or those whose thoughts have been long or painfully directed, especially during nervous exhaustion and susceptibility, to these topics, and to the punishments of a future state, and have become impressed by exaggerated ideas of their own wickedness; not infrequently become melancholic, and after a time theomaniac. But, whilst this latter state of mental disorder may thus appear consecutively in some, it may occur primarily, from the same moral causes, in others. In the former cases, it is a state of morbid mental reac-

tion consequent upon the previous depression, and belief of condemnation; in the latter, it is a state of primary mental excitement, connected with more or less delusion. The instances of religious excitement furnished by the "revivals," the camp meetings, and field preachings in America and Scotland, the modern "gift of tongues" in this metropolis, are all forms of this kind of partial insanity; which, however, is sometimes of temporary continuance only, especially in hysterical and excitable females; but which often passes into more furious mania, or confirmed insanity. The frequency of this form of mental disorder in females, and other circumstances belonging to its history in this sex, show its occasional connection with hysteria; and that at least the hysterical state favours its occurrence.

123. *β. Cacodemonia.*—Newton remarks, that when men abandoned the worship of the true God, the stars became the first objects of their idolatry, as most striking to the senses; and were supposed to exercise a continued and active influence on the mind. Melancholy was then thought to depend upon the course of the planets; and the frequent periodicity of the disorder confirmed the belief. Hence the word *μηνη*, luna, furnished the appellations mania, lunaticus, lunacy, for this and other mental disorders. The doctrine of spirits taught by Socrates, Plato, and even by still more ancient philosophers, having become associated with Christianity, the influence of these spirits upon the human body became an article of general belief, and was implicitly received, until the Reformation, and the mental freedom to which it led, dispelled the mists of superstition. The dread of yielding to the instigations of the devil, and of being in the power of demons, led to the institution of exorcisms, and to ceremonies in the more primitive church, to deliver those who were believed to be thus possessed. These ceremonies tended to cherish the idea as to the influence of evil spirits; and was, indeed, with various concomitant circumstances, the chief cause of the continued belief in this source of mental disorder. With the extension of popish superstition, the numbers of demonomaniacs increased; and, in many of the larger cities of Europe, stated feasts and ceremonies were established for their cure. The pomp and solemnity observed on these occasions, and the crowds assembled, struck the imaginations of those affected, and contributed to the cure of a few of them. In these times, demonomania assumed a variety of forms,—and the most common and the most recent were those of sorcery and witchcraft. As long as both church and state prosecuted and cruelly punished those objects of self-delusion and of popular belief, the community were firmly persuaded of the reality of demonomaniacal possession; but as soon as governments ceased to punish these extravagancies, the chimerical fears which affected the populace, and by which the minds of the weak, of the melancholic, or of the hysterical were tortured, gradually subsided, and ceased to produce their wonted effects, and cases of this form of derangement were rarely observed. The progress, also, of education and of knowledge dissipated these errors, which led to, and nurtured, a belief in the influence of demons; yet still, in popish countries, some monomaniacs believe themselves in the power of demons, and furnish instances which may serve to illustrate, or to explain, the psychological extravagancies which disgraced governments and religion for so many centuries. The delusions arising out of ignorance, improper education, and superstition, gave rise, in those days, not only to the most humiliating errors of the understanding, but also to the most cruel exhibitions and actions of which human nature was capable. The history of mental delusions arising out of the superstitions, the wild doctrines, and the fanatical extravagancies which disgraced Europe for so many ages, furnishes innumerable proofs, not merely of the narrow limits of the human understanding in those times, but also of the degraded state of the passions and moral sentiments. How frequent and how horrible were the instances which then daily occurred, not only of the delusions of ignorance and superstition, but likewise of the lowest depravation of moral feeling! A reign of superstitious terror continued to exert its baneful influence on the human mind, blighting the intellectual powers, and withering the most generous and ennobling of the moral emotions.

124. In the present day, although the instances of monomania arising from a belief in the power of demons, or evil spirits, are rare, those which proceed from other causes of terror — especially from the fears of future damnation, as inculcated by fanatics and enthusiasts, and from the dread of imprisonment or of civil punishment—are as numerous as ever, — each case presenting characters derived from the principal cause of disorder. In modern times, M. Esquirol remarks,—and especially during the civil commotions in France, in the end of the last, and commencement of the present, centuries, — monomaniacs express as much dread of the tribunals of justice, as they formerly entertained of the influence of demons and of evil spirits. It is always fear, dread, and anxiety, which affect these unfortunate creatures, and cause the disorder which possesses them.

125. *c.* Misanthropic Monomania is sometimes met with, particularly in persons of a melancholic temperament, who have become hypochondriacal, or who have experienced disappointments in their affections and friendships, or who have been unfortunate in their attachments and well-founded hopes. In these persons, and even in others where the origin of the affection is less manifest, dejection of spirits is associated with malevolent feelings; and the resulting effects are, a distrust of every one, and a belief in machinations and persecutions intended for their ruin. They are in a state of continued misery; they believe themselves objects of universal hatred and detestation. They not only conceive plots of all kinds being formed against them, but also consider their dearest friends to be their most implacable enemies. They suspect poison in their food or drink; and their imaginations convert every act or every expression into designs to injure or to insult them.

126. *f. Excess of self-love* is an ingredient in every modification of monomania; but when exaggerated ideas connected with personal advantages or mental accomplishments are entertained, —when self-love, in the more common forms of vanity or of pride, is inordinately indulged,— either the mind becomes disordered from the repeated or continued contemplation, or the mental disorder is coloured by this circumstance when produced by other causes. Dr. Prichard observes, that ex-

cessive self-love, combined with an elated and sanguine disposition, instead of depressed spirits and a morose temper, produces cheerful illusions, which always maintain their relation to the person of the lunatic. A monomaniac fancies himself a king, the pope, a favourite of Heaven. This, however, does not constitute a single delusion, leaving the mind perfectly sane upon other points; for the same individual generally magnifies himself in other respects. Nor does the gay and cheerful state of monomania always result from this association of excessive self-love with the sanguine disposition, as supposed by Dr. PRICHARD; but rather from a vitious education, and from the excessive indulgence of the emotions of vanity and pride, especially in early life, in connection with various concurrent causes acting upon the nervous system of susceptible, weak, and nervous persons.

127. *g.* The preceding comprises all necessary to be stated in order to recognise the more simple states of partial disorder of the understanding. But, as these states are often consequent upon moral disorder, and occasionally are associated with it from the commencement, the physician should be prepared to meet with, in practice, numerous instances of *the association or complication of these forms of derangement.* To describe the almost innumerable modes in which each of the several forms of moral insanity may be complicated or associated with either of the varieties of partial disorder of the understanding, would be endless; and even to adduce instances illustrative of some of the more striking states of this complication, would be far beyond my limits, and be attended by few advantages. The works of GUISLAIN, HEINROTH, PRICHARD, and ESQUIROL furnish sufficient examples of this association; and to these I refer the reader. Besides, no one can possibly mistake cases of this description, when they come before him in practice, nor misapply the means, moral or medical, which they require for their treatment.

128. ii. GENERAL INSANITY.—In general insanity, not only are the *moral emotions* and the *intellectual faculties* weakened or deranged, but all the *instinctive desires* and *feelings* (see note, § 66.) are also disordered. The ideas are in a state of confusion, and perpetual and general disturbance, and none of the powers or manifestations of mind can be exercised even for the shortest period. General insanity presents three principal species, usually denominated *Mania*, or raving madness; *Dementia*, or incoherent insanity and mental imbecility; and *Fatuity*, or annihilation of the mental faculties. To each of these I proceed to direct attention.

129. *A.* MANIA, or *Madness — Hyperphrénie*, of GUISLAIN — *Raving Madness — is characterised by a disordered association of ideas, which are reproduced without connection and with extreme rapidity, by remarkable derangement of the understanding or judgment, by alienation of the affections, by the violence of the will or volition, and frequently by false sensations, illusions, or hallucinations.* — It is either a chronic disease, or liable to lapse from an acute into the chronic state; is commonly unattended by general fever, although the pulse is usually more or less accelerated, especially at an early stage; and it chiefly consists of *perturbation* and *exaltation of the sensibility; of disturbance of the instinctive, the intellectual,* and *the moral manifestations of mind;* and of *excitement of volition.*

130. *a.* The *acute form of mania* presents itself in different grades of intensity; the *mildest* of which has been denominated by GUISLAIN, *Tranquil Mania*, and may be named *sub-acute mania;* the most violent, as described by CHIARUGGI and others, may be called *hyper-acute mania.* Either state, however, may pass into the other; and both may commence more or less suddenly, and reach their acme with great rapidity. Generally, however, *premonitory symptoms*, manifestly indicating very serious vascular disorder in the brain, have existed for some time before the mind becomes evidently deranged. In the case of an eminent writer on medicine, who died some years since, marked indications of vascular excitement in the brain were evident to me more than a twelvemonth before mania burst forth. Almost always for some days, often for some weeks, and even for months, before the disease is established, occasional fits of excitement and perturbation, disturbing for a time the judgment, are experienced. The patient is, during this time, or at various periods, in a state of agitation, of feverishness, and of uneasiness. He is restless; morbidly active; his imagination is lively; he is full of projects, often trifling or absurd; and he enters upon pursuits with energy, but relinquishes them quickly and without sufficient reason. His head is generally hot, his feet cold; his sleep is short, broken, and disturbed; and he either lies awake, ruminating on various speculations; or gets up, paces the room, or attempts to occupy himself, but each successive attempt is soon relinquished, in a state of perturbation, or of quiet distraction. During this period, some experience fits of painful terror, or of agitation, and not only pass sleepless nights, but by day are in a constant state of uneasiness and restlessness, or of action leading to the performance of little or nothing. Others are disquiet and depressed, and are impressed by a feeling of an impending calamity, or by a dread of losing their reason. In some, the appetite is voracious; but the stomach is readily disordered, and intemperance is followed by severe affection of this organ. In others, the appetite is deficient or capricious. The bowels are often torpid. At this period, a desire of intoxicating liquors, and intemperance in the use of them, are manifested suddenly, although previously disliked.

131. At length reason is overturned. The individual scarcely knows what he says; repeats his words often, or talks nonsense, or is unable to complete his sentences, or suddenly breaks off in the middle of them. He utters confused expressions, in a rapid or impetuous manner; or he makes ineffectual efforts to collect and to express his thoughts. He appears to those about him in a state resembling intoxication. He laughs, cries, is irritable, is prone to anger on the least opposition, and is most obstinate, self-willed, and capricious. This morbid state of mind may continue for some time, — particularly when humoured by friends,— without exciting much alarm, or leading them to adopt measures of restraint. At length, on some attempt being made to interfere with, or to oppose, his absurd pursuits, he breaks out into the wildest violence, and even attempts acts destructive of, or injurious to, others or himself, and requiring the most strict coercion.

132. This state may exist without any false perception, or delusion. Very frequently, however, as soon as violence is manifested, some illusion or hallucination, or absurd impression as to his own person or powers, or his relation to others, appears; but it is seldom permanent, as in monomania; it is soon forgotten, or gives way to some other phantom.

133. *a.* In the *milder*, or *sub-acute cases*, the disease may proceed without much violence, unless the patient be greatly excited; but his emotions are capricious, warm, and enthusiastic, and his ideas are confused, inconsistent, or unconnected. He seems half drunk, and like one who endeavours to collect his thoughts and to express them connectedly, but fails in the attempt. His temper is irritable; he is self-willed; his habits, feelings, and affections are changed; he is incapable of any exertion, of attention, or of thought; is in a constant state of uneasiness and of restless action, without being capable of performing any thing; and is altered in countenance, expression, and general appearance.

134. *β.* In *severer*, or *more acute cases*, or as the disease increases in violence, all the phenomena are more developed. The malady may proceed for many days, or even weeks, before it reaches its highest pitch. During this period, the derangement varies somewhat according to the predominance of particular feelings or passions. Sometimes the patient is terrified and agitated; frequently he breaks out into the most violent expressions of rage and enmity against his relations or friends, or whoever may have been obliged to exert control over him, or restrain his mad proceedings, uttering bitter execrations, or threatening vengeance and condign punishment. His nearest and dearest relatives are now the objects of his most vehement displeasure. As the malady approaches its acme, his ideas become more and more disordered and unconnected. His thoughts and feelings are expressed with exclamations and ejaculations, with the utmost agitation of countenance and manner, and with the most violent and irregular gesticulation and action. He is so absorbed by his internal sensations and emotions, as to be almost unconscious of external objects and impressions. He seems deprived of all affection, of all ideas of right and wrong, of every feeling of shame, of every principle of probity and honour, and of all parental or filial affection. The advice, conversation, or even the presence, of near relatives, irritates or exasperates him. He utters the most blasphemous, the most filthy and indecent, language; and the most injurious, calumnious, scandalous, and unjust expressions, respecting his dearest friends. Many maniacs are disregardful of cleanliness and personal decency, and are most disgusting in their expressions and habits. They seem as if excited by an internal heat, enabling them to bear, often with complete impunity, the continued impression of great cold; and they sometimes even complain of it either in the head, or in the abdomen, or circulating in their veins. Hence their desire to go almost without clothes, or to expose their persons. They are occasionally deprived of sleep for many days, or even weeks, together. They generally become more or less emaciated, and the features haggard, wild, or maniacal. Their eyes are watery, suffused, red, prominent, brilliant, and fixed or vacant. Their motions are quick and threatening; and the expression of their countenances so changed, as often not to be recognised by their friends. All the functions are now disordered. The bowels are obstinately costive, especially early in the disease; but afterwards they are often irregular. The appetite is frequently lost for many days; but it is sometimes voracious. The tongue is furred or loaded; the skin cold and clammy, excepting on the head; and a frothy saliva, mixed with mucus, is often excreted.

135. *γ.* The *most acute states of mania* have been graphically described by Pinel and Chiaruggi. At the commencement of such cases, the patient is impetuous, audacious, menacing in his aspect, and shameless in his habits; his forehead is contracted; his eyebrows are drawn up; his hair bristled, and his breathing hurried. His evacuations are deficient; and his skin becomes dirty and sallow. His countenance begins to glow; his eyes become fiery and sparkling; his looks unfixed; his eyelids drawn widely open and closely shut by turns; his eyeballs prominent or protruding and injected; he is insensible of cold and hunger; and his sleep is lost, or it is very short and unquiet. As the disease proceeds, his loss of reason, violence, and anger are remarkably increased; he shrieks, roars, rages, abuses his dearest friends; destroys or breaks whatever comes in his way; tears his clothes to pieces; and is often disposed to go quite naked, or with his person exposed. Whoever touches him, is abused or struck by him. His ideas are strangely confused, and his mind is occupied by absurd prejudices or delusions. After a period of violence, stillness takes place for a short time; and when alone, he talks, gesticulates, and exclaims, as if he were wrangling with persons about him. When restrained, or confined, his countenance assumes a satanical or ferocious expression: he throws away, with imprecations and shrieks, the food presented to him, but is compelled by thirst to swallow fluids. After some days, hunger begins to be felt; and often the most disgusting things are taken greedily. Even the excrements, in some instances, are devoured; and the evacuations, which are usually dark and offensive, are smeared over the clothes, beds, or walls. Notwithstanding the patient's constant exertion, and prolonged want of sleep, his muscular strength seems to increase; his limbs acquire remarkable pliability and nimbleness, and the greatest feats of strength and agility are performed without exhaustion. However bold and menacing he may be, a strong threatening voice, a piercing and commanding look, and even the sight of the means of secure restraint, readily daunt him. After his violence has expended itself, he becomes still, or gloomy, and appears as if brooding over something; but he breaks out, often unexpectedly, into a new storm of rage and violence. At length a real cessation of violent paroxysms ensues: exhaustion, with unquiet sleep, disturbed by fearful dreams, takes place. The pulse becomes small, the general aspect squalid and meagre, and the countenance pallid and haggard. The patient is now obstinately silent, or sings and laughs in a strange manner, or chatters with incessant volubility; and at times seems as if lapsing into a state of fatuity; but these uncertain intervals are frequently interrupted by short fits of violence. Memory, how-

ever, continues without much impairment during the course of the disease, and the senses possess an unusual degree of acuteness and susceptibility.

136. Acute attacks of mania generally attain their highest intensity, or begin to decline, in about a month from their commencement. In many, however, intervals, or remissions merely, of the violent symptoms occur, about or soon after this time; and from such remissions may be dated the accession of the advanced or chronic stage of mania. When patients do not recover after a succession of attacks, either the powers of mind are exhausted to so low a grade, that the disease lapses into permanent fatuity, or the mental exhaustion continues as a period of calmness, after which an attack of violent madness recurs; or it passes into a state of melancholy, or of mental incoherency. As the maniacal attack becomes chronic and confirmed, so frequently does it assume either of these forms; but, in the more prolonged cases, sense and understanding are more and more completely abolished. During the more acute states of the disease, patients are rarely affected by any epidemic or contagious malady; and, according to several authors, dropsies, consumption, and various other chronic diseases have disappeared on the accession of violent madness. In many cases, however, the disappearance of these has been illusive, the maniacal affection merely *masking* the pectoral or other disease, which may have been in some degree interrupted in its course, but rarely removed, or even materially benefited.

137. *b. Chronic* or *protracted mania* is generally consequent upon either of the forms of *acute mania;* but it may follow any of the varieties of *partial insanity*, already described; or it may appear as the *primary affection*. This last, however, is the least frequent mode of its accession. It is, in many instances, merely a stage of transition between acute mania and dementia or incoherency, but a very protracted one in most cases, and of very uncertain duration. It often lasts for many years, and sometimes for the greatest part of life, and is the state of alienation presented by the great majority of the inmates of asylums. *Chronic mania* is characterised by marked impairment of the powers of attention, memory, comparison, combination, and, consequently, of judgment; and is a state of intellectual weakness, in which none of the operations of mind is performed with effect, often associated with some false perception or delusion. The individual is quite incapable of continued conversation, and of the duties of society: his conduct and actions are without consistency, steadiness, or rational object; and his thoughts are wandering and incoherent, He presents a state intermediate between either monomania or mania, and dementia or incoherency — a mental condition, combining many of the phenomena of these disorders. It is to this class of cases — to this form of mania — that the term lunacy is, perhaps, most applicable. Dr. PRICHARD remarks that many continue long to display the characters of mania; but, except during particular periods of renewed violence or agitation, to which most are subject, they become more tranquil than at the commencement of this complaint. They show signs of incipient dementia combined with morbid activity of body, in which the excitement characteristic of their disease exhausts itself in almost perpetual action. Lunatics of a different class fall into a state of calm reverie; their imagination, abandoned to itself, without the control of judgment, gives itself up to wanderings without end. Even in attempting to converse, or when their attention is excited by questions, they exhibit a strange mixture of reason and mistakes, both as to facts and inferences. Others — and these are the most numerous — are governed by some particular passion, mental habit, or delusion; the illusion having reference to their own persons, or to their relations to other individuals.

138. The illusions in this form of disorder are not, like those in monomania, cherished in the mind, and brooded over in silence, in solitude, or in gloomy reserve: they are more connected with the present objects of sense, and are for ever changing with the casual alterations of feeling or temper. In a great number of those who are threatened with general paralysis, or who are already attacked by it, M. CALMEIL has shown a peculiar form of delusion to exist. The patient is in a state of exaltation or of joyous delirium, fancying himself the owner of millions, of towns, empires, &c. He is intoxicated by the flattering belief, and joy manifests itself in his features and gestures. Illusions of this kind often precede the accession of paralysis for several months, and continue for some time afterwards; but they are gradually obliterated with the last traces of intelligence, as dementia becomes developed. In other instances, the joyous delusion assumes a form of maniacal delirium, with excessive agitation and anger; and continues with short intervals of quietude until death ensues, or until it terminates in dementia. In a great many protracted cases, the principal phenomena are referrible to some particular habit or active propensity, and are unconnected with any hallucination or false perception. Indeed, every variety of human pursuit occasionally becomes the subject, in relation to which especially chronic madness is exhibited; and the disorder is displayed, in many instances, rather in the mode of action and conduct, and in the general weakness, or abolition of certain powers of the mind, than in any hallucination or illusion.

139. *c.* The *course* of mania is *continued, remittent*, and *intermittent*. The *remissions* may be more or less distinct and regular. They often take place every second day. Whilst there are many maniacs who scarcely ever sleep, there are some who sleep tolerably well. The former are often more quiet during the day than in the night. Others, again, are quieter and more impressible in the morning and in the evening. *Intermittent* mania is sometimes regular, and sometimes irregular, in its accessions. According to ESQUIROL, it constitutes about one third of the number of maniacal cases. It may assume either the quotidian, the tertian, or the quartan type. Or the attacks may recur every eight days, or every month or three months, or six months, or even after longer intervals. They are frequently induced by moral or physical causes, of a manifest kind, as contrarieties, and disorders of the stomach or bowels. Females often experience an accession of mania about each menstrual period, or after each lying-in, or when they suckle, or after weaning. In some it returns every spring, or every summer. Intermissions are more frequent in mania, than in any other form of insanity.

140. *d.* Mania is sometimes *complicated* with

cutaneous diseases, very commonly with hysterical symptoms in females, and often with hypochondriasis in men. It is frequently associated with epilepsy, and still oftener with paralysis, and with other forms of insanity; this last circumstance is the chief cause of doubt and difficulty in the classification of mental disorders.

141. *e.* The *Duration* of the malady varies from two or three days to many months or years. In its more prolonged forms it generally consists in a number of accessions and remissions. It may alternate with phthisis, hypochondriasis, and melancholia; but the pulmonary disease is only suspended during the maniacal attack. It may *terminate*, also, in either of these; but most frequently in dementia, paralysis, or fatuity, or in either dementia or fatuity conjoined with palsy.

142. *f.* The *Diagnosis* is apparent from the description I have given of mania. The more or less general disorder of the mental powers, and the turbulence, violence, and agitation attending it, sufficiently distinguish it from melancholia, and other forms of partial insanity. In the latter, a few only of the affections, the passions, and the desires, or of the sensations, perceptions, or ideas, are deranged. In mania, all the powers concerned in forming the understanding, and in distinguishing between right and wrong, are overturned; and the ideas, feelings, passions, and impulses arising in the mind violently influence the will, they being no longer controlled by the powers of the understanding, nor guided by notions of propriety. The violence, perturbation, and rapid transition of passion, of impulse, and of action, are consequences of disordered excitement, expressed more or less generally upon the moral emotions, and of deprivation of the instinctive feelings and of the intellectual powers, as well those of consciousness as of intellection and reflection. The moral emotions or affections of mind being morbidly excited and uncontrolled by the restraining and guiding influence of feeling and intellect — of affection and judgment — the disordered impulses of the will, and the disposition to commit absurd acts, become strong and violent, especially when opposed, unless the opposition be manifestly above removal.

143. *g.* The *Prognosis* is more favourable in this form of insanity, than in any other, although the most violent and alarming in its symptoms. — *a.* A *favourable result* is often attended by some critical evacuation or change, and especially by discharges from the stomach or bowels; by bilious evacuations; by epistaxis, hæmorrhoids, menorrhagia, leucorrhœa; by ptyalism; by cutaneous eruptions, particularly boils, carbuncles, and erysipelas. As long as mania is simple, it is cured more frequently than any other mental disorder; and especially if there be no very apparent or strong predisposition to it. A first attack generally admits of cure, if it be not complicated with palsy or epilepsy. A second seizure is also often removed, if it remain uncomplicated. But recovery becomes very much more doubtful after the third attack. M. Esquirol states, that of 269 cases of mania that recovered, 132 were from first attacks, 77 from second, 32 from third, 18 from fourth, and 10 from a greater number of seizures. The duration of the disease, in cases of recovery, is much shorter than in other forms of insanity, recovery generally taking place within the first year. Of the above 269 cases, 27 recovered in the first month, 32 in the second, 18 in the third, 30 in the fourth, 24 in the fifth, 20 in the sixth, 20 in the seventh, 19 in the eighth, 12 in the ninth, 13 in the tenth, 23 in the eleventh and twelfth, 18 in the second year, and 13 after the second year. The greater number of recoveries took place in autumn and summer.

144. *β.* An *unfavourable issue* is to be anticipated, if mania has continued longer than two years, and if it be complicated with palsy, epilepsy, or any organic disease. It is certainly fatal in any of these complications, chiefly from the nature of the malady associated with it. Instances are very rare of simple mania terminating fatally. The most frequent maladies causing death in mania are typhoid, or adynamic fever with cerebral affection, general paralysis, pulmonary consumption, epileptic convulsions, and exhaustion of nervous power. M. Esquirol asserts, that no appreciable organic lesion is found in the brains of those who have been subjects of recent uncomplicated mania. But in this, as will be shown hereafter, he is opposed by MM. Foville, Calmeil, Bayle, Guislain, Haslam, Prichard, and others.

145. *h.* The *Causes* which produce mania more especially may be briefly enumerated. — *a.* The acute states of the disease take place most frequently in spring and summer, and chronic cases are often exasperated in those seasons, and in high ranges of temperature. The disease more frequently commences some time between the fifteenth and forty-fifth year, than at any other epoch of life; and it is only in robust persons that it appears later than the fifty-fifth or sixtieth year. When it occurs at an advanced period of life, it is very apt to pass quickly into dementia, or to become complicated with paralysis. It also is more common in males than females, and assumes a more acute or violent form in the former than in the latter. Sanguine, nervous, and irritable temperaments, plethoric and robust constitutions, and susceptible and ardent dispositions, are most predisposed to this species of insanity. Employments and professions have a less marked influence in causing it: yet it appears to be somewhat more frequent in merchants, speculators, military men, and artists, than in persons otherwise occupied.

146. *β.* The individual occasional causes of mania are numerous, and very rarely act singly, but generally in various combinations, in producing their effects. In many cases, there is not merely a concurrence of causes, but also a certain sequence in their operation, necessary to produce the disease. A fright occasions suppression of the catamenia, and this is followed by mania, which subsides upon the return of the uterine discharge. — *Moral* causes are more influential than physical causes. Disappointed affection, frights, jealousy, and domestic misery, affect women chiefly; whilst mental exertion, reverses of fortune, and wounded self-love, principally affect men. — Of *physical* causes, hereditary conformation is by far the most common, and it is almost equally so in both sexes. The next in frequency are parturition, suppression of the catamenia, and abuse of spirituous liquors. The following enumeration is according to the influence they exert, as estimated by M. Esquirol. *Moral causes.* — Domestic unhappiness, disappointed love, fright, reverses of fortune, want, humiliated or injured self-love, excessive mental

exertion, jealousy, and passion. *Physical causes.* — Hereditary disposition, parturition, disordered menstruation, the abuse of intoxicating liquors, venereal excesses, masturbation, the critical periods of life, injuries of the head, insolation, fevers, the suppression and disappearance of cutaneous eruptions and of accustomed discharges, the abuse of mercury, apoplexy, epilepsy, &c., hypochondriasis, and melancholia, have been also enumerated as causes, but they are, when observed, the early or premonitory stage of the malady. (See *General View of the Causes of* INSANITY.)

147. *B.* DEMENTIA — *Incoherency — Imbecility — Amentia,* SAUVAGES — *Incoherent Insanity,* PRICHARD — *Démence,* PINEL — *is a chronic form of insanity, characterised by impairment of the sensibility and of the will, by incoherence of the ideas, and by the loss of the powers of consciousness and of the understanding.* — A person thus mentally deranged is no longer able to perceive and apprehend matters correctly, to seize their relations, to compare them, or even to attend to them. He cannot comprise, in his mind, an exact idea, or even a tolerable notion, of any one subject or object; but is occupied unceasingly with unconnected, incoherent thoughts, and with emotions arising spontaneously, without association or aim. PINEL defines this state of mental disorder to be an incoherency of ideas, which have no relation to external objects; a turbulent and incoercible mobility; a rapid and instantaneous succession of ideas which seem to be developed in the mind, without any impression having been made upon the senses; a continual and ridiculous flux and reflux of chimerical ideas and notions, which destroy each other almost as soon as produced, without intermission and without connection; a similar incoherent but calm concurrence of the moral emotions, of the sentiments of joy, sadness, or anger, which arise and disappear spontaneously, without leaving any trace, and without evincing any correspondence with external impressions.

148. *a.* An imbecile or demented person is deprived of the power of adequately perceiving objects or circumstances, of seeing their relations, of comparing them, of preserving a complete recollection of them; whence results the impossibility of reasoning or reflecting on them. He is incapable of forming any opinion or judgment, because external objects make too feeble an impression; because the organs of transmission have lost a part of their energy, or because the brain itself has no longer sufficient power to receive and to retain the impression transmitted to it: hence the feebleness, obscurity, and incompleteness of the sensations and perceptions. Being unable to form a just idea of occurrences or objects, the demented person cannot compare them, or exercise abstraction or association of ideas; his mind has not energy enough to exert attention, or any mental operation necessary to the integrity of its functions. Hence the most incongruous ideas succeed each other, without dependence and without connection or order: hence he talks without being conscious of what he says; and he utters words and sentences without attaching to them any precise meaning. It seems as if unreal expressions were heard by him in his head, and as if he repeated them in obedience to some involuntary impulse, the result of former habits, or fortuitous associations with objects which strike his senses.

149. A loss of the powers of perception, of attention, and of suggestion or association of ideas, and the consequent defect, or entire loss of memory — of the powers of consciousness and of intellection (see note, § 66.), — are manifestly the earliest and fundamental changes constituting dementia, whether in its *primary*, or in its *consecutive forms* (§ 150, 151.). Hence the want of sequence or connection between the ideas, the intellectual imbecility, and the assemblage of phenomena, which I have stated this disorder to present. It must be obvious that, originating in the failure of those fundamental powers, dementia will *vary in grade,* with the amount of such failure; and that the resulting effects, manifested by the higher faculties and by the moral emotions, will also vary, not only in degree, but also in kind, according to previous habits, disposition, &c. — giving rise, at first, to *imbecility* or to *incoherence,* the two slighter grades of *dementia.*

150. Incoherency, imbecility or complete dementia, appears either *primarily,* from the operation of the predisposing and exciting causes upon the mind or constitution; or *consecutively* upon other disorders of the mind or brain, which, by their long duration, or their severity, affect the alliance of the former with the latter, and the intimate condition of structure of the brain more especially. When dementia occurs *primarily,* it is usually caused by whatever overwhelms the powers of the mind, or completely exhausts them, as inordinate mental exertion, vehement emotions, protracted and inordinate anxiety; and, as I shall have to point out hereafter, it may thus appear primarily, not only as simple incoherency, but also complicated with general paralysis or epilepsy.

151. Where dementia takes place *secondarily,* it is generally directly consequent upon protracted mania, or upon partial insanity, or upon apoplexy, severe phrenitis, epilepsy, palsy, irregular gout, or fevers attended by cerebral determination and severe or protracted delirium. This consecutive state of dementia has been termed fatuity: it was confounded with idiotcy, until ESQUIROL very accurately distinguished between them; and showed that dementia is exhaustion or obliteration of an intellect which was once sound, by intense mental causes, or by maniacal or other diseases; whereas, idiotcy is a congenital state of fatuity, or an original want of the intellectual powers. The idiot, he remarks, has never possessed the faculties of the understanding sufficiently developed for the display of reason. The victim of dementia was once endowed with them, but has lost this possession. The former lives neither in the past nor in the future; the latter has some thoughts of times past, reminiscences which excite in him occasional gleams of hope. The idiot, in his habits and manners of existence, evinces the semblance of childhood; the demented person preserves, in his conduct and acts, the characteristics of consistent age, and bears the impress derived from the anterior state of existence. Idiots and Cretins have never possessed memory, judgment, sentiments; scarcely do they present, in some instances, indications of animal instincts; and their external conformation plainly indicates that their organisation is incapable of thought.

152. M. ESQUIROL has distinguished *three varieties* of dementia, — viz., the *acute,* the *chronic,*

and the *senile*, — either of which may be *simple*, or *complicated* with melancholia, mania, epilepsy, convulsions, scorbutus, and especially with general paralysis. — The *first variety*, or *acute dementia*, is caused by gross irregularities of regimen, diet, &c., by fever, hæmorrhages, by metastasis, suppression of accustomed discharges, and a lowering treatment of mania. It is sudden in its attack, is unattended by lesion of movement, and is curable by means of regimen, exercise, and restoratives, by the removal of the cause, &c. — The *second*, or *chronic dementia*, is either primary, or consecutive upon the diseases just mentioned, more frequently the latter. When it succeeds other forms of insanity, as mania or monomania, it preserves some traces of the character of the primary disorder, or of the dominant idea during the previous affection. When it is caused by drunkenness, it presents peculiar characters, the chief of which are general tremor, false perceptions, rapid pulse, general perspiration, &c.; and it closely resembles *delirium tremens*, — which, indeed, may be more correctly viewed as an acute form of dementia, than as a distinct malady. When dementia arises from this cause, it more frequently assumes an acute and a curable form, than a chronic and persistent state, — a circumstance which seems to have escaped M. Esquirol.—The *third variety*, or *senile incoherency*, comes on gradually with the progress of age, and shows itself in the loss of memory and of sensibility, in the weakness of the impressions and sensations, of attention and perception; in the vacillations, and uncertainty of the will; and in the slowness and incapability of motion.

153. Dr. Prichard considers that incoherency presents *four stages*, or *degrees*, consisting of different phenomena; the description of the one stage not being applicable to the other. If the disorder commences in the first degree, it goes on successively to the more advanced; but the more severe degrees may appear at once, as the immediate effects of causes which destroy the powers of mind, or produce disorganisation of the brain. —The *first stage*, or degree, he remarks, may be termed that of *forgetfulness*, or loss of memory. Its chief characteristic is a failure of memory, especially as to recent events.—The *second stage* brings with it a total abolition of the power of reasoning, depending on a loss of voluntary control over the thoughts. It may be termed the state of *irrationality*, or *loss of reason*.—In the *third degree*, the individual is incapable of comprehending the meaning of any thing that is said to him. It may be styled the stage of *incomprehension*.—The *fourth stage* is characterised by loss of instinctive voluntary action. The individual is destitute of even the animal instincts; he cannot obey the calls of nature. This is the stage of *inappetency*, or *loss of instinct or volition*.

154. The *first* of these, however, does not amount to dementia. It is often a premonitory state, or stage, which passes into complete incoherency or imbecility; but it as often continues simple, and stationary, without passing into more marked disorder. This is especially the case in old persons. They often lose their memory, particularly of recent events; and their sensibility, and the power of quick or rapid movement, become impaired. Recent impressions in them are weak; and hence they live upon past recollections, which they have pleasure in recalling. But their powers of reason and their judgment are not materially weakened; and, until these become very manifestly affected, they cannot be viewed as presenting even the slightest form of this species of insanity.—The *second* and *third grades* of dementia particularised by Prichard, are the common forms in which the disease occurs in either its primary or its secondary states. In these the powers of reason are lost; and the patient is as unable to control his ideas, as he is incapable of comprehending the meaning of any thing to which his attention may be called. The *fourth grade* is identical with the variety of general insanity about to be noticed, under the head of *Fatuity*, or annihilation of the powers of mind (§ 164.).

155. *α*. The *slighter forms* or *grades* of dementia, or *incoherency* and *imbecility*, are evinced by a loss of control over the ideas, and of the faculty of attention. The individual occasionally apprehends something of the meaning of a question; but, before he has uttered half his reply, he becomes confused or bewildered, and is turned aside from it by some accidental or new suggestion. His expressions are consequently irrelevant and absurd. In this state, his memory may not be altogether lost, though very much impaired, and glimmerings of reason are occasionally evinced. He affixes some meaning to his expressions, but he soon loses or forgets it. He may know his friends, but he displays no signs of sensibility or of emotion on being visited by them. In such cases, the *incoherency* is remarkable. In others, the impairment or loss of the powers of consciousness and of intellection (see note, § 66.), and a state of intellectual *imbecility* are more or less manifest. — Some patients, in these states, are capable of being employed in mechanical occupations, and particularly in what they had previously been habituated to; but even in these their imbecility is often conspicuous. Others, particularly when dementia is consequent upon mania, experience occasional paroxysms of excitement, in which the symptoms of more active mental disorder become prominent.

156. *β*. The *severer* or *confirmed states* of dementia are characterised by inability to comprehend the meaning of any question, however simple. Reason is entirely lost, and the person acts from instinct or habit. The physical activity is often remarkably displayed in this state of the disease. Some jump or run to and fro, or walk round in a circle; or dance and sing, or occasionally vociferate. Others cry or laugh by turns, or almost at the same time, or utter the most unmeaning jargon, or words without ideas, or mutter broken sentences, or expressions without any connection, or evincing the most trivial association, which may depend upon accidental sound, or some sensible object attracting momentary attention. Many sit in silence, with a sedate look, or a vacant smile, or an unmeaning stare, and hardly utter a word for weeks, months, or even years. Some crowd round a stranger and gaze at him, having intelligence barely sufficient to perceive something new; and others have a propensity to ornament themselves in a strange or a fantasticmanner, or to add whatever may be in their way to their dress, which is always singular or ridiculous. A few continue crouched in a particular posture, which they always prefer, though it seems the most un-

easy or painful; and, if placed in a different position, they soon resume their accustomed posture.

157. *γ*. The disorder of the sensibility and of the understanding is, to a certain extent, pourtrayed in the *countenance*. The features are motionless and devoid of expression. The look is wandering or vacant. The face is pale; the eyes are dull and moistened with tears; the pupils are dilated; and occasionally the features are distorted from relaxation of some of the facial muscles. The body is thin and emaciated in some cases, and full and fat in others. In these latter, the face is full, and the conjunctiva occasionally loaded. In a few, but little indication of mental disorder is evinced by the countenance.

158. *δ*. The *bodily*, and especially the *organic*, *functions*, are not materially disturbed. Sleep is sound and prolonged. The appetite is unimpaired, or it is increased almost to voracity. The alvine evacuations are free, sometimes fluid; and in many cases corpulency supervenes. Occasionally, when mania or monomania is about to pass into dementia, the transition is indicated by obesity. When paralysis appears in the course of the disease, the paralytic symptoms manifest themselves slowly and successively. Articulation is first impaired, afterwards locomotion is executed with difficulty, and, lastly, the evacuations become involuntary. But this complication is only contingent, and as such will be noticed hereafter.

159. *ε*. The *course* of dementia is occasionally *acute*, but much more commonly it is *chronic*. It is *simple*, or *complicated* in the manner about to be noticed. It is generally *continued*, but it is sometimes remittent, or even intermittent. Its duration is most various, from a few days or weeks, to many years.

160. *b*. The *Diagnosis* of dementia cannot be difficult, excepting at the time when mania or monomania is passing into this state; and then the symptoms will indicate the predominance of either. Maniacs and monomaniacs are carried away by false sensations and perceptions, by illusions and hallucinations, by the excitement, the exuberance, and the determined character, of their ideas and of their emotions: the demented person neither imagines nor supposes any thing: he has almost no ideas; he neither wishes, nor determines, but yields to every the slightest impulse or suggestion: his cerebral power is exhausted. In the maniac or partially insane, every thing announces power and strong effort; whilst, in the demented person, every thing betrays relaxation, feebleness, or complete mental impotence.

161. *c*. The *Causes* of which dementia is more especially the consequence, are either moral or physical; but the two orders are often associated, or the one is accessory to the other, in their operation.—*Moral causes* affect females more frequently than males, and the higher than the lower ranks of society; but are much less influential in occasioning this than the other forms of insanity. They are chiefly — excessive or frequent excitements of the passions, domestic unhappiness, political commotions, frights, sudden grief or joy, disappointed affection and ambition, misfortune and want.— *Physical causes* are the most concerned in occasioning this species of insanity. The progress of age, fevers with cerebral determination or predominant affection, congestion and chronic inflammation of the brain and its membranes, the cessation and disorders of the catamenia, are the most common of this class. After these follow — masturbation and venereal excesses, the abuse of intoxicating liquors and of narcotics, the excessive use of mercurials, parturition and the accidents consequent upon it; epilepsy, apoplexy, palsy, injuries of the head, and excessive or prolonged mental exertion, especially when prematurely commenced, or before the brain is duly developed, suppression of cutaneous eruptions, of gout or rheumatism, and of accustomed discharges, have likewise caused, or contributed to cause, dementia. This species of mental disease is, however, most frequently consequent upon mania, or some one of the several forms of partial insanity, especially when these have been treated by too large sanguineous depletions, or by other too active and lowering means.

162. Hereditary conformation or influence, the phlegmatic and lymphatic temperaments, debility caused by irregularities and excesses, and exhaustion of cerebral power by these or by inordinate indulgence of the passions, weak, timid, or irresolute constitutions of mind, and original feebleness of the intellectual powers, *predispose* to dementia.

163. *d*. The *Prognosis* of dementia is extremely unfavourable, especially as respects the more severe cases. In the milder states or stages of the malady, a few instances of recovery occur, especially when a paroxysm of acute mania supervenes. The apparent reaction of the system is, in these cases, sometimes followed by perfect rationality. Attacks of fever attended by delirium are often fatal to lunatics; but of those who recover from them, not a few have their faculties restored to them. When the physical health of persons in dementia improves at a time when the mental disorder seems to be increasing, and especially if they eat, sleep, and digest well, and become fat, recovery may be almost despaired of. If any of the *complications* about to be noticed take place, recovery can no longer be anticipated. Even in this state, patients may linger for many months, or even years, until carried off, by the extent of cerebral lesion, or exhausted vital power, or by the complications of the malady, or rather by the organic alteration on which the complications more immediately depend.— The *changes* found on dissection of fatal cases will be described hereafter.

164. C. FATUITY, or *Annihilation of the Powers of Mind*. — This may be viewed as the last stage, or an extreme degree of dementia, but it sometimes follows almost immediately upon mania or some one of the forms of partial insanity. — *a*. In this state, all the mental powers, and even most of the animal instincts, are lost. The individual continues to possess a state of organic existence, but deprived of all the functions of the brain, and nearly of all the functions of sense. He is scarcely conscious, evinces little or no desire or aversion; is often unable to control, or is not cognisant of, the calls of nature. One stands in a state of vacant unconsciousness; another sits rocking himself to and fro, or yelling or chanting unmeaning words; a third is quite motionless, with his head hanging on his breast, or with his eyes and mouth half open. In this state, the patient is often destitute of the feelings of hunger or thirst, and occasionally even of that of pain. He may linger in this condition for years, but he can never altogether recover from it. A few may be roused, by favourable circumstances, to a less extreme state of mental

annihilation than I have described, — to a state of dementia above this in the scale of intellectual privation, — but a relapse always occurs after a short time.

165. *b.* Fatuity is often *complicated* with partial or general paralysis; and, occasionally, attacks of convulsion or of epilepsy take place, and sometimes terminate this state of existence. In most instances, and especially when fatuity is complicated, the countenance assumes a peculiar character, owing to the absence of all action in the muscles of the face, to the general relaxation of the features, and to the laxity of the integuments of the cellular tissue. The whole frame indicates, by a flabby state of the tissues, the exhausted condition of cerebro-spinal nervous power. — The organic functions are generally but little disordered, excepting as respects the processes of excretion. Owing to defective voluntary control, and the unconscious state of evacuation, the patient often presents a state of disgusting filthiness, difficult to be prevented, and requiring strict attention, in order that the consequences to which neglect uniformly leads may be warded off.

166. ii. COMPLICATED INSANITY.—The several forms of insanity — of the partial as well as the general disease — are often variously complicated. Not only may the different varieties of partial insanity be associated in numerous modes; but general insanity may present, especially when consequent upon monomania, a predominance of disorder as respects certain ideas, feelings, or trains of thought. I have already shown, that moral insanity often passes into disorder of the understanding; and that, in such cases, not only both states of derangement subsist, but some additional disorder, in many instances, is at last superadded. Thus, states of general alienation, more or less complete, are often ultimately developed, presenting either of the states of mania or of dementia, often with prominent disorder on certain subjects, or a disposition to entertain certain emotions or ideas in preference to any other. These states of alienation, however, can hardly be denominated complications, inasmuch as they are various modes in which the mental disorder generally goes on increasing, when uncontrolled by treatment, until the powers of mind are altogether overturned, or even annihilated. The morbid associations, therefore, to which I now proceed to direct attention, are strictly complications, or contingent associations of bodily disease with insanity, and are of so frequent occurrence, and of so great importance in regard of the course and termination of the cases in which they are observed, as to require a particular notice. The circumstance, also, of the mental disorder, and the contingent bodily disease, generally proceeding from a source common to both, — from derangement of the circulation within the cranium, and often from organic lesion, either intimate and hardly appreciable, or gross and obvious, — also demands a more special consideration of this subject.

167. *A.* The COMPLICATION WITH GENERAL PARALYSIS is the most common and the most important of any that occurs in practice. I have already fully described its different *stages* or *degrees* (§ 33. 36.), and shall notice, at this place, certain particulars only that did not fall within the scope of that description. This form of paralysis is often indicative of chronic inflammation of the meninges, and is distinct from the paralytic affections consequent upon cerebral hæmorrhage, or upon softening, tumours, &c. of the brain, — which, however, may also be complicated with insanity, although much more rarely than the general form of the affection above described. It, in a few instances, precedes, and in most supervenes upon, the mental disorder. It sometimes appears with the first symptoms, or during the acute period, of insanity; and generally commences in the manner I have stated (§ 33.), and increases as the mental powers diminish. Whatever form the mental disorder may have presented, it soon passes into chronic dementia, when complicated with paralysis. It generally terminates the life of the patient within three years; death being preceded by cerebral congestion, convulsions, diarrhœa, and gangrene of those parts sustaining the weight of the body when muscular support has been lost. This form of paralysis is much more frequent in men than in women. Of 109 insane paralytics under the observation of M. ESQUIROL, during three years, at Charenton, 95 were males. Of 609 lunatics admitted at this institution, in three years, 109 were paralytics; — the proportion in males and females being — in 366 male lunatics, 95 were paralytics; and of 253 females, 14 were thus affected. Of 334 lunatics in the Asylum of St. Yon, near Rouen, 31 were paralytics, — of whom 22 were men, and 9 women. At the Bicêtre, the proportion of paralytics to the number of lunatics is much smaller. It is observed by M. ESQUIROL, that this complication occurs most commonly in those lunatics who have caused their insanity by venereal excesses, by intoxication, by the abuse of mercury, and by mental exertion, — circumstances which account for the greater prevalence of it in males than in females. The lunatics at Charenton, where it is most frequently observed, have been in easy circumstances, and have possessed means of gratifying their passions, or have exercised professions which have excited or over-exerted the brain, without duly exercising the body.

176. According to M. CALMEIL, this affection has generally, at Charenton, appeared soon after the commencement of insanity; but it sometimes has not occurred until insanity has continued for many years. A few individuals have displayed all the vigour of intellect for some time after they were attacked by it, and derangement has afterwards taken place. If the mental disorder has not already proceeded, it very rapidly proceeds, in this complication, to advanced or complete dementia; yet persons thus affected preserve their appetites, or have them greatly increased. They are in all other respects in health. The circulation is natural, and the sleep undisturbed. They continue plump, but the soft solids are flabby and soft; and, as the disease proceeds, they are liable to constipation, often followed by diarrhœa, by unconscious evacuations, and by want of power over them, owing to palsy of the sphincters. Retention and incontinence of urine generally also take place, and aggravate the evils to which the paralytic person is liable.

168. *a.* The *duration* of this complication is various; but is reckoned by MM. ESQUIROL and CALMEIL to average about thirteen months; very few surviving longer than three years with it.— The ultimate *prognosis* is most unfavourable. M. ROYER-COLLARD, after an experience of twenty

years, had not met with one instance of recovery from it. M. CALMEIL has seen only two cases, thus complicated, that recovered; and M. ESQUIROL has mentioned only three. The appearances observed after death will be stated hereafter.

169. General paralysis is apparently more frequent in Paris than elsewhere. There can be no doubt, however, that it has been more accurately observed amongst the insane in that city, and indeed through many parts of France, than elsewhere. Dr. BURROWS had stated it to be comparatively a rare disease in England. M. ESQUIROL doubted this, and inferred that it was considered rare, because it it had not been accurately observed in this country. There is much truth in this, as shown by the recent inquiries of Dr. PRICHARD. This physician states, that he had made many inquiries with a view to determining this question, but had met with considerable difficulties in obtaining satisfactory information. The facts, however, which he has adduced, prove that this is a frequent complication of insanity in this country, although not so frequent as in Paris; and in every respect confirm the accuracy of the observations furnished by MM. ESQUIROL, CALMEIL, and other French pathologists.

170. *b*. There is a modification of paralysis, as Dr. PRICHARD truly remarks, of frequent occurrence, during protracted insanity and dementia, in English hospitals for lunatics, that differs in duration, and in some of its features, from the general paralysis so accurately described by the French writers. It resembles the debility or decrepitude of extreme old age. Patients affected by it, sit crouched with their heads hanging down; and when they attempt to raise themselves into the erect posture, their limbs tremble, they stoop, and totter. Some stand leaning against a wall for whole days, with their bodies curved forward, their heads and necks hanging down, and their upper extremities shaking and hanging useless. Such patients are always in the most advanced stage of dementia, and often continue in this state of paralytic decrepitude for many years. Some become bedridden, and remain long incapable of any voluntary movement, until at length either the powers of life are gradually extinguished, or they are carried off as in the form of paralysis previously described (§ 33.).

171. *c*. Paralysis from cerebral hæmorrhage, from softening, from tumours, or from other organic lesions of a portion of the brain, is also observed in insane patients, but not so frequently as the varieties of this affection already noticed. In these cases, it generally assumes the form of hemiplegia; but it sometimes continues in a partial or limited state,—being confined to one arm, or to the muscles of one side of the face, or to the arm and face, for a considerable time. It may even proceed no further, although more commonly it passes into palsy of the whole side. In these the attack is gradual, slow, and *chronic;* and usually proceeds from softening, or from some other change of structure, in a portion of the brain or of its membranes. In other cases, the paralytic affection is more sudden and *acute,* and is consequent upon an apoplectic or comatose state, or upon an epileptic or convulsive seizure. It may be at at once hemiplegic; or it may be at first more partial, and become more complete, either gradually, or after relapses or repeated attacks of sopor or convulsion. This more acute form of palsy seems to proceed from congestion or sanguineous effusion in the brain; but it has occurred without any organic lesion having been found to account for it. (See *Appearances in the Brain, in Paralytic* INSANITY.)

172. The more usual forms of paralysis may precede the insanity; but they most frequently take place in the more confirmed and chronic states of mania, and especially in dementia and fatuity. They are evidently more or less intimately connected with the pathological conditions upon which insanity depends, as well as with the consequences which these conditions produce, as will be shown hereafter. Whilst palsy in the insane is generally incurable, insanity is equally so when thus complicated.

173. *B*. VERTIGO, or *Giddiness,* often precedes and accompanies insanity. The two forms of vertigo — the one from active congestion of blood in the brain, the other from a defect of the supply of blood to this organ — may attend mental diseases. It is extremely necessary to distinguish between these two opposite conditions of the cerebral circulation, with reference to this affection. When vertigo proceeds from the former state, it is characterised by a sense of rapid gyration in the head, by throbbing in the temples, a beating noise in the ears, succeeded sometimes by vomiting or nausea, and occasionally by loss of consciousness: when it arises from the opposite condition of the circulation, it resembles a gradual swimming,—objects appearing as approximating, or receding from, the organs of vision, or becoming dark, — and is attended by a sense of faintness. It is requisite to attend to these two very different forms of vertigo, inasmuch as they indicate important and opposite states of the cerebral circulation; and, as in the more partial forms of insanity, they often precede the accession of mania, or the occurrence of some dangerous complications.

174. *C*. EPILEPSY and CONVULSIONS are frequent complications of every variety of insanity. Either of these affections — either the regular paroxysm of epilepsy, characterised by sudden loss of consciousness, frothing at the mouth, injury of the tongue, and subsequent sopor; or the more gradually developed fit of convulsion, in which these phenomena are not present — may precede or follow the mental disorder. In every instance, congestion or determination of blood to the head becomes remarkable during the paroxysm, although there may have been a deficient supply of blood to this quarter shortly before. The occurrence of these complications is generally owing to insolation, to suppression or disorder of the catamenia, to violent excitement or exercise, especially during warm weather, to injudicious bathing, to the use of intoxicating liquors, to venereal excesses and masturbation, to habitual gluttony or excesses at table, and to the other causes enumerated in the articles on these diseases. Epilepsy occurs most frequently in those who have complained of vertigo, headach, incubus, and of restless dreaming sleep; and an attack is generally preceded by some of these symptoms, or by an aggravation of mental disorder.

175. Insane persons, predisposed to epilepsy or convulsions, as well as epileptics disposed to insanity, generally present a peculiar prominence of the eyes, sometimes with a puffy or wrinkled state

of the surrounding integuments, partly arising from congestion of the blood-vessels, and particularly of the veins, in the vicinity. This is observed also in mania, and still more so in epileptic mania. The eye also has a kind of glaze over it, distinguishing it from the convex eye of near-sighted people.

176. When an attack of epileptic or other convulsions is followed by mania, or any other form of mental disorder, the latter often disappears, sometimes in a few days or weeks, under judicious treatment; but it always returns with the convulsive affection, — and after repeated attacks, the mental disorder becomes more severe, more general, as respects the mental powers, and more confirmed, until the patient rapidly sinks into dementia or fatuity, in which state apoplexy, or some one of the forms of palsy, is sometimes superadded. In this case, life is terminated, after an uncertain time, either by a paroxysm of convulsion, or by one of the later complications. Although epileptic mania generally pursues this unfavourable course, when neglected or injudiciously treated, yet it sometimes admits of alleviation, or even of cure, when judiciously managed. — When epilepsy or convulsions occur in the course of any of the more chronic forms of insanity, the latter is very rarely cured; if death does not take place soon, it lapses into complete dementia or fatuity.

177. Mania complicated with epilepsy is characterised by ferocious, malign, and often murderous paroxysms, or exacerbations, which frequently take place most suddenly. The fury of the patient is sometimes directed against himself; but oftener against others, especially those he most loves when sane. Dr. Burrows observes, that when paroxysms of mania suddenly attack persons subject to epilepsy, a reckless fury is exhibited by them, different from the characters of true mania. It seems as if the epileptic impulse, when not ending in convulsion, acts upon the brain in a peculiar mode, imparting to it that particular action denominated epileptic mania. The most horrible actions have proceeded from this complicated form of insanity. Sometimes the destructive paroxysm or impulse is produced by some fanatical opinion or idea, prompted by a misconstruction of some scriptural passage, by some delusion, or waking dream. Persons thus affected may have lucid intervals of considerable duration. But although the paroxysms are sometimes preceded by some signs or symptoms, yet they are often so sudden that mischief is occasionally done before it can be prevented. Hence epileptic maniacs should not associate with other insane persons, — and especially as the sight of epileptic paroxysms may produce the like in other maniacs. The appearances observed after death in epileptic and convulsive insanity will be noticed hereafter.

178. *D.* Apoplexy may be the *cause* of insanity, or it may be the *consequence* of those intimate lesions of structure which either occasion, or are connected with, the mental disorder. Esquirol considers that apoplexy constitutes a sixth of the physical causes of mental alienation, and an eighth of the deaths. Dr. Burrows thinks, that it is not so frequently a cause of insanity, or of death, in this country, as M. Esquirol states with reference to France. When apoplexy is connected with the production of insanity, it is generally congestive or hæmorrhagic; and, in the latter case, is generally followed by paralysis, — the mental disorder being complicated with hemiplegia, or with a more partial form of palsy. Apoplexy with effusion of blood generally occurs early in the mental disorder, and commonly in the maniacal form. When apoplexy precedes mania, there is often a great change perceived in the moral and intellectual character, for some time before the attack. Dr. Burrows justly remarks, that this change in the character may usher in an apoplectic as well as a maniacal paroxysm; and hence the affinity between sanguineous apoplexy and mania is evident.

179. The sudden deaths, however, which take place in chronic mania, and in confirmed dementia, and in the complication of insanity already noticed, are seldom produced by cerebral hæmorrhage. They were formerly ascribed to *serous* apoplexy; but as I have shown (see Apoplexy, § 115.) that the form of this disease, usually imputed to the effusion of serum, depends rather upon exhausted organic nervous power, in connection with congestion, or interrupted circulation of the vessels of the brain, than upon effusion, — which, even when present, is seldom in such quantity as to account for the fatal event, — so it may be inferred that sudden deaths in these chronic forms of general insanity are chiefly owing either to congestion, or exhaustion of nervous power. The fatal attack either commences with sudden or profound coma, which is soon followed by convulsions; or it begins with convulsions, which are soon succeeded by coma, rapidly terminating in death, — the apoplectic or the convulsive state being thus consecutive, or both, in a few instances, being simultaneous. Either of these forms of attack is often immediately consequent upon a paroxysm of furious mania, or of delirious excitement; and, in some cases, a state of acute or furious delirium, or of insane agitation, terminates at once in death, without convulsions or coma — at least, of any appreciable duration — having preceded the fatal event. This termination, which may be viewed as a form of apoplexy, has been noticed by Pinel, Esquirol, Burrows, and others, who have described it as occurring only in old and cachectic cases, and as being preceded by a sudden accession of maniacal or delirious excitement, which soon ceases, and the patient dies, as if from exhaustion of vital energy. On dissection, but little is found in the brain to account for the event; and the body soon passes into putrefaction. These forms of apoplectic attack are identical with those which I have ascribed, in the article Apoplexy, to exhaustion, or loss of the organic nervous energy of the brain, — a state formerly noticed by Boerhaavf, and designated by him *Apoplexia defectiva.*—It is probable, however, that, in the cases of insanity, in which the sudden death is consequent upon distinct evidence of general cachexia, the event is caused rather by sudden privation of power in the heart, or by sudden congestion of the lungs, or other affection of these organs, than by loss of the nervous energy of the brain.

180. A state of profound and continued *coma* occurs in the course of a few cases of insanity. It may follow mania; and I have seen it, in one instance, consequent upon moral insanity. I believe that it takes place chiefly in those states of mental disorder which have been produced by depressing

causes. The two cases which I have had an opportunity of observing, have been prolonged, and evidently owing to exhaustion of the vital manifestations of the brain. Restoration took place from this state, but the powers of the mind were never, even partially, recovered. The *apoplectic* and *comatose* complications, especially of chronic mania, of dementia, and of fatuity, — particularly when terminating quickly in death, or characterised by sudden collapse or exhaustion of nervous power, — occur most frequently in winter and during cold weather, and are occasioned chiefly by causes which depress or exhaust the powers of life.

181. *E.* HYSTERIA, CATALEPSY, and CATALEPTIC EXTASY also occasionally precede, and occur in the course of, insanity. The two latter affections, however, are rarely met with, but have been observed by HALLER, BOERHAAVE, LIEUTAUD, TISSOT, PARRY, BURROWS, and myself,— chiefly, however, as antecedents of insanity. Hysteria is observed most frequently at the commencement of mental disorder; and it sometimes passes into a state of moral or partial insanity, which after a time subsides. Hysteria is often associated with hypochondriasis; and both when thus associated, and when severe and prolonged or habitual, insanity is occasionally consequent upon, and subsequently more or less manifestly complicated with, it. It is of the utmost importance, in practice, to recollect the connection, when females come under treatment. In these cases, the mental disorder, as well as the hysterical affection, proceed from a common source: uterine irritation or disease is propagated to the cerebro-spinal nervous system, and the functions of the brain are consequently more or less disturbed.

182. *F.* DISORDER OF THE DIGESTIVE AND ASSIMILATING ORGANS very generally *precede* and *complicate* disorders of the mind. I am persuaded, that much too little importance is attached to this circumstance, in respect both of the pathology and treatment of insanity. The organic functions are often generally deranged — commonly more or less weakened — long before the mind is affected. Digestion is impaired, although the appetite may be natural or even increased; and the bowels are generally torpid, and require large doses of purgatives to act upon them. They are sometimes irregular, from irritation of the digestive mucous surface having reached a considerable pitch, or from the presence of offending matters. The secreting and assimilating functions of the liver are likewise impaired; — the bile is either scanty, or retained in the ducts or gall-bladder, until it acquires irritating and morbid states; and the vital influence of this organ on the venous blood circulating through it is insufficiently exerted. Hence the chyle is imperfectly prepared, and the blood abounds either in unassimilated elements, or in materials which require to be eliminated from it. To these circumstances especially are to be attributed much of the disorder consecutively observed in the functions of the brain, of the lungs, and of the heart; and, at length, many of the organic lesions of these organs, which complicate, and ultimately terminate, the more severe cases of mental disease. The general *cachexia* often preceding insanity, and still more manifestly attending it, is the result of the morbid states of the chyle and blood consequent upon deficient organic nervous energy throughout the digestive and assimilative organs. Many of the structural changes, as well as the scorbutic state of the body, which very often take place in the more chronic cases of insanity, proceed from the morbid conditions of the fluids, consequent upon this impaired state of nervous power.

183. BROUSSAIS, and most of his followers, have attributed the disorder of the digestive organs preceding and attending insanity, to *chronic inflammatory irritation of the gastro-intestinal mucous surface;* and have even considered the mental affection to be frequently symptomatic of, or caused by, the disorder of this surface. Without disputing the occasional presence of chronic gastro-enteritis, both previously to, and associated with, mental derangement, I believe that, when it is present, it is chiefly contingent upon the state of organic nervous influence just contended for, and upon the irritating state of the contents of the alimentary canal, arising out of imperfect digestion, and a morbid condition of the secretions poured into it. This subject, however, will be further noticed hereafter.

184. *G.* There are *various other diseases* which arise in the course of insanity — or are contingent upon it, — and which even cause its fatal termination in many instances. The chief of these are consumption, diseases of the bowels, scurvy, organic lesions of the heart, dropsical effusions, gangrene, &c. These are actually complications, inasmuch as the mental disorder generally proceeds in connection with them for a longer or shorter period, and as they have little or no influence in terminating the mental disorder otherwise than in death. Some of them, particularly diseases of the lungs and pleura, may suspend it, or cause it to intermit, but they have no further influence over it, of a beneficial kind. They, however, often tend to aggravate it, or to cause the slighter and more partial forms to pass into those more general and severe. I shall notice them further in the following chapter.

185. IV. TERMINATIONS OF INSANITY.—i. PROGNOSIS. — Insanity terminates either in *recovery* or in *death;* but it may be said to terminate otherwise, when one variety lapses into another, especially into one of a severer or more complicated form, or when one alternates with another. Although this transition of one state of disease into another closely allied to it, cannot be strictly considered as a termination of it, yet it requires notice, as possessing great practical importance. Much of the information upon which opinions are to be formed as to the results of mental disease, is furnished by the statistics of lunatic asylums — sources of notorious inaccuracy in this country, especially up to a very late period. Much of this inaccuracy arises from the regulations by which those institutions are governed, — from the classes of patients which they receive or reject, — and from the periods their inmates are allowed to remain under treatment. Many recent cases, both acute and slight, are treated in private practice, and recover in a short time, which do not come into any account either of the number affected, or of the number cured. The systems of treatment pursued in different asylums, public and private, and in states of individual seclusion, are so diversified, — in many instances, most inappropriate — in some, calculated to aggravate and perpetuate the malady — in others, altogether inert — in numerous

cases, without the least reference to very manifest physical disorder, characterised by obvious symptoms and signs — and in not a few, without regard to intellectual or moral guidance, — that numerical results obtained from these sources may flatter those who rejoice in a parade of precise details, without considering the soundness of the data upon which they are calculated, or the fallacies which are involved in them, or the unsound inferences which they encourage and propagate, but can never satisfactorily inform those who look for instruction from unexceptionable, and from, at least, tolerably instructed, quarters. In a country, where the institutions — public and endowed as well as private and mercenary — for the greatest and most humiliating of human calamities, are shut against professional instruction, — where these institutions, and those to whom their medical management is intrusted, furnish the least possible modicum of professional information, — where asylums are made more for the profitable and safe custody of the inmates, than for their recovery, — what can be hoped from statistical and numerical statements, but mystification, if not positive deception. Whilst, therefore, I adduce such information as I can obtain, I give it with due note of its imperfections, that it may not be estimated above its real value. There are, however, some sources — especially those to which most frequent reference is here made — that deserve somewhat more of confidence than should be reposed in many others.*

186. *A.* The Duration of insanity is most various. The disease has subsided, in some cases, within a few days from its commencement; in others, it has continued for twenty, thirty, or even forty years. — *Recoveries*, as well as *deaths*, occur at all periods from the commencement of the malady. If neither of these events takes place at a somewhat early period, confirmed insanity generally succeeds, and sooner or later assumes the form of dementia, and sometimes ultimately passes into a state of fatuity. In this case, the malady goes on until it terminates in *death*, which takes place either in its simple or complicated states.

187. *B.* Recovery is the result in a large proportion of cases of insanity; but the proportion varies remarkably in the several forms and complications of the malady. It is very important, in respect both of the history and classification of the disease, and the *prognosis*, to determine, as accurately as possible, the number of cures in a given number of cases. But before the general results furnished by the imperfect sources already alluded to, or the estimates made from the reports of lunatic institutions, be at all considered, it will be preferable to take a view of the several circumstances which influence the event of the malady, but which vary in character, in combinations, and in their effects, in different countries, climates, places, and asylums. These circumstances are — the particular kind of mental disorder; its causes, predisposing and exciting; its duration, continuance, or recurrence; its existence in a simple or in a complicated state; the physical disease with which it is associated; and the age, sex, constitution, occupation, &c. of the patient.

188. *a.* The *form of the disease* has a marked influence upon its curability. M. Esquirol states that a greater proportion of the cases of mania is cured than of any other form of madness, and that dementia is scarcely ever cured; but, of 518 recoveries at Charenton during eight years, the numbers were — 263 cases out of 545 of mania; 251 out of 715 of monomania; and only 4 out of 281 of dementia. But of the aggregate of 1557 cases, there were 274 paralytics, 62 epileptics, and 15 idiots; so that the curable cases were 1205, and of this number upwards of two fifths were cured. He further remarks, that the greater sanability of maniacs comparatively with monomaniacs had place chiefly in males; monomania being, from this, more curable in females than in males. The following table will give a more precise idea of the results obtained by M. Esquirol at Charenton: —

Form of Disease.	Male Cases.	Female Cases.	Total Cases.	Males recovered.	Females Recovered.	Total recovered.
Monomania -	372	343	715	123	128	251
Mania - -	334	211	545	160	103	263
Dementia and Fatuity -	227	69	296	1	3	4
General Total -	933	623	1556	284	234	518
Deduct Incurable Cases -	-	-	351			
	-	-	1205	-	-	518=1 : 2·34

189. *b.* The *causes* have a manifest influence upon the event in mental disorder. But they are so variously associated in producing their effects, that it is very difficult to advance any precise statement on this topic. Hereditary predisposition, and the more powerful physical and moral causes, especially when combined, must be viewed as unfavourable circumstances. Indeed, all the causes which I have enumerated as especially influential in occasioning dementia may be considered in this light.

190. *c.* The *age*, *sex*, and *constitution*, of the patient are material considerations in forming a prognosis. — The most favourable *age* for recovery is between the 20th and 30th year. But few recover after the 50th year. M. Esquirol states, that, of 209 recoveries at Charenton, the greatest number of cases were from the 25th to the 30th, and from the 30th to the 35th year. This is the period of greatest vital energy, when acute mania oftenest occurs. Recoveries diminish progressively from the 45th year. The diminution is more abrupt in females, and more gradual in males. Twenty men, however, recovered after the 50th year, in which number were 4 out of 12 lunatics who had exceeded 70; so that advanced age does not preclude hope.

191. Insanity is, generally speaking, more curable in *women* than *men*. When it is evidently connected with a condition of the natural functions which is susceptible of change by medical art, or by the efforts of nature, or the progress of age, a hope of cure may be entertained on these grounds. Thus recoveries have often taken place in females at critical periods. M. Esquirol men-

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* On this subject, as well as on many others connected with insanity, much interesting remark will be found in an able analytical article in the 13th No. of the *British and Foreign Quarterly Review*, which came before me after a great part of this article was sent to press. It is at least consolatory, that the able author of this paper, and of an excellent work on Insanity, should be placed over the County Asylum.

tions instances of dementia in females which had continued from early youth, and had terminated on the appearance of the catamenia; and others which had commenced at that period, and had recovered when the catamenia ceased. When the disease has followed the suppression of an eruption or of an accustomed discharge, a cure may be hoped for, by re-establishing the suppressed evacuation or eruption, or by means which have a similar effect upon the constitution.

192. *d.* The previous *duration* of the disease has a marked influence upon the curability of it. The chance of recovery is very much greater in the early than in the advanced periods. Dr. Willis stated that 9 cases out of 10 were restored when they had been placed under his care within three months from the commencement of the attack; and Dr. Finch has declared that 61 out of 69 patients recovered who were received into his asylum within the same period from the appearance of the malady. Dr. Burrows, in his very excellent work, has reported 221 cures out of 242 recent cases. Dr. Prichard remarks, that 7 out of 8, or even a larger proportion, of recent cases have terminated successfully in the Retreat near York. This is as favourable a view of the result in recent attacks as can be entertained; and yet, when we consider that many recoveries from mental disorder take place in private practice without becoming known, and that the great majority of those cases which are admitted into institutions or asylums are either of some duration, or second or third attacks, or have withstood the treatment that had been adopted, it cannot be considered as being much too favourable as respects all very early states of this malady.

193. M. Pinel was the first, or amongst the first, to direct attention, by a memoir read at the National Institute in 1800, to the degrees of probability there existed of recovery at different periods of insanity. This eminent physician inferred, that a greater number of recoveries take place in the first than in any other succeeding month; and that the mean duration of the malady, in cases of recovery, is from five to six months. According, however, to M. Tuke and M. Esquirol, the mean duration of these cases is somewhat under one year. I believe that M. Pinel's conclusion is more correct as regards all instances of recovery, and especially as comprising recent cases, many of which are not comprised in the accounts furnished by public institutions; whilst M. Esquirol's inference is applicable chiefly to these and similar institutions. This writer states, that of 2005 female lunatics, 604 were cured during the first year, 497 in the second, 86 in the third, and 41 in seven succeeding years. From the tables furnished by him, and by Mr. Hitch, of the Gloucester Lunatic Asylum, to Dr. Prichard, as well as from other data, it may be truly inferred, that recovery is probable in proportion to the shortness of the duration of the malady. The importance of proper treatment at an early period, and the impropriety of sending a patient hurriedly off to a house of confinement, with no assurance of a proper system of treatment being persevered in, is very evident from these data, as well as from numerous other considerations. — A recent writer justly remarks, that cases are not wanting to prove, that the mind may recover even after many years have been passed in a state of insanity; and that such cases have sometimes been overlooked or concealed, there is too much reason to suspect. Instances are adduced by MM. Beaumes, Esquirol, and Chambeyron, in which recovery took place after madness had continued for twenty years, or even longer,— especially upon the establishment of a natural, or of a suppressed discharge, or of suppuration, or some extensive counter-irritation or evacuation. From Mr. Hitch's tables it would appear, not only that the greater number of cures occurred in recent cases, but that, in some, recovery took place in a short time after admission, although the disease had been of long anterior duration. Of five patients, insane for ten years, one was cured in nine months, one in ten months, the third in a year, and the other two in six months; and one who had been insane forty years was cured in four months. Three other cases recovered after eleven, seventeen, and twenty years. These facts are sufficient to prove that, from the long duration of the disease alone, recovery is not altogether to be despaired of.

194. *e.* The *complications of insanity* very remarkably influence the terminations of it. The association of any of the forms of the disease with general or partial *paralysis*, and of dementia especially with general palsy in any grade, is a most unfavourable circumstance, — recovery hardly ever taking place, as shown above (§ 168.), in any of these cases. — The complication with *epilepsy*, or *convulsions*, is also most unfavourable. When mania is consequent upon severe attacks of epilepsy, or when the maniacal affection is very violent in the intervals of these attacks, few or no hopes of recovery should be entertained. When, however, convulsions appear during the high excitement of mania, a somewhat more favourable opinion of the event may be formed. — The antecedence, or supervention, of *apoplexy*, or of *coma*, is a circumstance admitting of as few hopes as the preceding complication. — The occurrence of *phthisical symptoms*, or of obstinate *diarrhœa*, in the course of the mental disorder, especially when the latter is not followed by amendment, generally indicates a more or less speedy termination in death.

195. *f.* The *seasons* have a slight influence on the issue of insanity. Mania is more frequently cured in summer and autumn. The month of October presents the greatest number of recoveries; the month of February the fewest. Males are more frequently cured in July and November, females in October and May. Of 518 cures, M. Esquirol found, that 92 took place in winter, 123 in spring, 145 in summer, and 158 in autumn.

196. *g. As to the proportional number of recoveries in various countries and places*, great differences are found to exist; depending chiefly upon the restrictions, or the latitude, observed in public institutions, as to the admission and retention of patients. Dr. Burrows states, that 240 cures were affected, in his practice, in an aggregate of 296 cases of various kinds; 221 recovering out of 242 recent cases, and 19 of 64 old cases, or 81 in 100 of all cases, and 91 in 100 of those which were recent — a proportion much greater than that furnished by any other source; but very nearly agreeing with the statements of Dr. Willis. Dr. Jacobi considers that this high proportion can be explained only on the supposition that many patients were dismissed as cured upon the first appearance of amendment, or before recovery had

been fully established. He states, that in the asylum under his management, only 40 cases completely recovered out of 100, and six were alleviated. M. Esquirol states, that of 5360 admissions into French hospitals, 2691 were cured; and in the *Memoirs of the Academy of Medicine* (vol. i. p. 40.) he observes, that 4968 were cured out of 12,592 admitted into the Salpêtrière and Bicêtre, many of whom were idiots, epileptics, and paralytic, and fatuous aged persons. The same writer assigns 5918 recoveries to 16,516 admissions into English lunatic asylums. From this it would appear, that the proportion of cures formerly obtained in English institutions for the insane is much less than that furnished by the French hospitals. Dr. Prichard remarks, that this is the more remarkable, considering the peculiar regulations of Bethlem and St. Luke's.—These hospitals present restrictions unknown elsewhere. They reject all who have been more than a year insane; also those affected by paralysis, epilepsy, or convulsions, idiots, the aged and the infirm, as well as those discharged uncured from other institutions; and all persons who have not recovered at the end of one year are dismissed. Yet, on comparing the reports of these hospitals with those of other institutions where no selection exists, the relative number of recoveries is not found to be so great as might be expected. Dr. Burrows states, on the authority of Stowe, who derived his information from Dr. Tyson, physician to Bethlem Hospital, that, " from 1684 to 1703, 1294 patients were admitted, of whom 890 were cured, which is a proportion of more than two in three. But from 1784 to 1794, 1664 patients were admitted, of whom 574, or rather more than one in three only recovered :—This is remarkable. Dr. Prichard gives, on the authority of Mr. Lawrence, the report of this institution from 1820 to 1833 inclusive; and from that it appears, that the total number of admissions were 2445, of whom 1124 were cured, 643 were discharged uncured, 70 at the request of friends, 385 as improper objects, and 99 died. Deducting the 385 subsequently excluded, the 2060 furnished 1124 cures, or considerably more than one half.

197. In the following hospitals, where no selection of cases is made, the proportion of cures is — 43 in 100 in the Stafford Asylum; 42 in 100 in the Wakefield County Asylum; 40 in 100 in the Lancaster County Asylum; and about 48 in 100 in the Gloucester Asylum. The following table, furnished to Dr. Prichard by Mr. Tuke, gives the admissions and the results in the Retreat near York, from 1812 to 1833 inclusive : —

Classes of Cases.	Number admitted.	Recovered.	Died.	Removed.	Removed improved.	Remain.
1. Cases of less than three months' duration -	63	51	8	1	2	1
2. Cases of more than three, and less than twelve, months' duration - - -	65	28	10	6	3	18
3. Cases of more than twelve months' duration - - -	101	31	15	17	4	34
4. Cases of relapse -	105	58	17	13	1	16
Total - -	334	168	50	37	10	69

Mr. Tuke states, that several cases, entered as recent, were properly old cases; and if these were excluded, together with those connected with diseases speedily terminating life, as consumption and apoplexy, the probability of recovery from insanity, in recent cases, is greater than nine to one. An able reviewer very justly remarks on this statement, which is strongly confirmatory of that long since made by Dr. Burrows, that it is deserving of attention, as the opinion generally entertained, in respect of cases even of recent date, is more unfavourable than ascertained facts should warrant; the desponding view taken of such cases evidently tending to relax the efforts which should be made for the recovery of them.

198. *C.* The *particular prognosis*, or *the symptoms especially indicating recovery* from insanity, requires a brief consideration. — *a.* A paroxysm of mania may continue a few hours, or days, or weeks, or longer, and then remit or entirely vanish; or it may assume the form of melancholia, and continue or alternate with mania to its termination. It is impossible to say when either form of insanity will subside: the more furious, however, the attack, the shorter, generally, will be its duration, especially in mania. But when a remission of violence is attended by amelioration of other symptoms, it is a favourable sign. If the malady have continued several weeks, and the system is suffering, the disease will prove obstinate, if not dangerous. Insanity terminates favourably more frequently by a visible decline of the symptoms, and a remission or complete intermission, than by critical discharges. To these last, M. Esquirol attaches too great importance, Dr. Burrows too little, in this disease; for, although alvine, hæmorrhagic, urinary, and suppurative discharges, or boils and cutaneous eruptions, do not certainly remove the mental disorder, even when taking place spontaneously, yet they frequently do remove it. Fevers, hydropic effusions, and gout,—particularly the last,—have also sometimes removed the mental affection. These, however, as well as other diseases, have more frequently been followed by a remission, or, at best, by an intermission only.

199. *b. Remissions*, when thus or otherwise observed, may continue for days, weeks, or longer; but the reason still continues partially deranged, and the sleep disturbed by dreams, or by unpleasant sensations, referrible to the head or senses of sight or hearing; and after a time the disorder resumes its full force. — *Intermissions* are a perfect restoration of the faculties for a time, varying in duration from two or three days, or a month, to several weeks, months, or even years. Sometimes the return of the attack is after regular intervals, or, *periodic*; but as often it is irregular. Insanity may cease after a time, having passed first into a remittent or an intermittent state; or it may disappear, more or less rapidly, and completely, without any return. A gradual and perfect restoration of the faculties, however, takes place in the great majority of cases of recovery, without any recurrence or exacerbation of symptoms constituting the states of disorder just mentioned.

200. *c.* The absence of false perceptions and delusions is a favourable circumstance; but when they continue after the abatement of physical violence, a protracted case may be anticipated. A return of the natural feelings, of the affections, particularly to near relatives, and to former habits,

is amongst the surest indications of recovery. But in all cases, in forming a prognosis, the mental phenomena should be viewed in connection with the physical symptoms and state of the patient, and with such changes in the economy as have usually been viewed as critical in acute maladies, and particularly those affecting the brain or its membranes, — especially the restoration of suppressed discharges, evacuations, and eruptions; or the spontaneous occurrence of these, — as the hæmorrhoidal and catamenial fluxes, epistaxis, diarrhœa, furunculi, a regular fit of gout, &c. The utmost caution, however, should be observed in giving an opinion as to the event; but it is preferable to hold out hopes of recovery as long as there is a chance of it, otherwise the efforts to effect it may relax, and the patient consequently suffer. The following inferences are not materially different from those arrived at by Dr. Burrows and M. Esquirol.

201. 1. A cure is probable in proportion to the youth of the patient. — 2. It is also probable in a ratio with the recentness of the attack. — 3. The chance of recovery is the greatest in first attacks, and diminishes with each subsequent attack, and with the duration of the disease and age of the patient. — 4. Mania is cured most frequently; next, melancholia and monomania; and lastly, and the least, dementia and fatuity. — 5. Melancholia is difficult of cure in proportion to the degree of depression; a dread of poverty, of poison, and perverted ideas of religion, indicating an obstinate disease. — 6. Chronic insanity, whether mania or melancholia, seldom recovers. — 7. The prognosis of puerperal mania is favourable. — 8. Insanity with a propensity to suicide is not unfavourable, if the patient comes early under treatment, and the disease be recent. — 9. Acute dementia is curable; but chronic demency and senile insanity are never entirely cured. — 10. Hereditary predisposition protracts, somewhat diminishes the chances of, but does not prevent, a cure: relapses and recurrences are, however, more to be expected where it exists. — 11. When the insane are capable of judging rightly of their own state, a cure becomes difficult. — 12. An amendment of personal appearance, attended by an improvement in the mind, is indicative of recovery. — 13. When the insane preserve or acquire all their physical functions, and eat and rest well, and present their usual appearance, without recovering their faculties, recovery is hopeless. — 14. Insanity caused by excessive study, by the slow operation of moral emotions, or attended by hallucinations, by pride, &c., is seldom cured. — 15. Complications with palsy, and apoplexy, are incurable, and are fatal ultimately: but those with epilepsy, or convulsions, may recover in very rare instances. — 16. Men are more liable to relapses than women; one half of all relapses occurring in the first three months after recovery.

202. ii. Of Relapses and Recurrences of Insanity. — Recoveries from insanity are either *complete*, or *incomplete*. Of the latter, there are many, who, although perfectly rational, are never capable of returning to the sphere they formerly occupied, or of performing the duties which they previously fulfilled; their faculties having sustained a shock which can never be altogether recovered from. Dr. Prichard considers such cases to be about one tenth of the recoveries. Others remain longer or shorter in such a state of susceptibility that the slightest causes occasion *relapses;* and they preserve their sanity only by continuing to live where no mental agitation or inquietude is likely to befall them, and throw them back into their former state.

203. *a.* A *relapse* may be said to occur, when the malady returns, whilst the patient has scarcely, or very recently, recovered, or when he is only in a state of convalescence. It may take place a few weeks, or two or three months, after an attack of insanity. The precise time, Dr. Burrows remarks, when a cure may be said to be complete, is assigned with difficulty. Many experience, for weeks, even months, after recovery, uneasy sensations or confusion in the head; and, as long as these are complained of, no confidence can be placed in the stability of the cure. But when these sensations entirely cease, and all the functions are restored, any subsequent access of insanity is, as in other maladies, a *recurrence* of it, and no relapse.

204. Men are said to be less subject to relapses than women; but this is not the case, for numerous circumstances influence the chance of this event taking place, and to most of those men are more exposed than women. As soon as convalescence commences, the care of the physician and attendants is especially required; for, if imprudent measures be adopted before this period has been succeeded by restored health, a relapse will probably be thereby occasioned. The middle and poorer classes are more apt to relapse than the rich; for the former go from an asylum direct to their misery, and to encounter the exciting causes — probably the same causes which produced their derangement; whilst the latter may enjoy intermediate measures of precaution. Most of the relapses, as well as recurrences, of the disease, proceed from a premature or incautious gratification of habits and indulgences concerned in the production of the primary attack, or from too great mental exertion for the weakened state of the faculties, or from mental excitements or contrarieties.

205. *b.* The probability of a relapse is generally in a ratio with the suddenness of recovery, and is most frequent in mania. Recurrences are most common in melancholia; and, as well as relapses, are very apt to occur, when the mind is influenced by religious fears. Relapses or recurrences are announced by nearly the same symptoms as preceded the first seizure; and when warning has been taken by these, and medical aid procured, a return of the malady is frequently prevented. Indeed, it should always be remembered, that, when the mind has been once disordered, a predisposition is thereby created to a return of the malady when subjected to any of the exciting causes. In some constitutions, this predisposition or aptitude to a renewal of the complaint is much stronger, than in others; and to its greater strength in some persons, is partly to be attributed the remittent or intermittent character it frequently assumes; and the periodicity which it often observes, and which is probably owing to an increase of the predisposition by various physical influences recurring at stated periods. Each successive attack increases the morbid tendency to a return of the malady, and shortens the interval between it and that which is to follow; until, at length, the

intervals not only become much shorter, but also more imperfect; and the disorder at last assumes a remittent, or a permanent form.

206. *c.* The *proportion of cases* in which insanity is recurrent, has been generally overrated, in the opinion of Dr. PRICHARD. Of 444 recoveries, M. PINEL reckoned 71 cases of relapse and recurrence: but, of these 71 cases, 20 patients had experienced several attacks; 16 had left the hospital too soon; 10 came afterwards under treatment, and recovered without relapse; 14 had given themselves up to grief and intemperance; and several others were unfavourably circumstanced. M. ESQUIROL reports 292 recurrences of insanity out of 2804 recoveries, or a little more than one tenth. M. DESPORTES states, that 52 recurrent cases were recognised at the Bicêtre, in 1821, out of 311 admissions; or 17 in 100: and that 66 were received at the Salpêtrière, out of 454 admissions; or 15 in 100. M. GEORGET, however, remarks, that there were, amongst these cases of relapse and recurrence, many who had been discharged in a state of incomplete recovery, as well as a number of drunkards who came every year to spend some weeks in these hospitals, having been taken there in a state of intoxication.

207. Mr. HITCH has furnished Dr. PRICHARD with the particulars of 68 re-admissions, from among 546 admissions. These 68 re-admissions occurred in 25 persons only; and of these, there were 17 men, 10 of whom were paupers, re-admitted forty-nine times; and 8 women, of whom 4 were paupers, who were received nineteen times. Many of those who were re-admitted, had been either removed uncured by the wishes of friends, or discharged "relieved on trial," their friends having found it necessary to replace them: some returned after an apparently perfect cure. The general inference at which Dr. PRICHARD has arrived, is manifestly correct, that the improbability of a recurrence of insanity increases with the length of time which has elapsed without any sign of renewed disease; and that it is also greater in proportion to the completeness of the recovery. When the energy of the mental faculties is fully restored, relapse and recurrence are much less to be feared than when they remain weak and excitable.

208. iii. OF THE FATAL TERMINATION OF INSANITY. — Although the state of the brain connected with insanity may be incompatible with the due exercise of the mental manifestations, yet it may not so disturb the physical functions, as very materially to shorten or endanger life. This is shown both by the duration of insanity in many cases, and by the longevity of lunatics. Instances are adduced by M. DESPORTES and others, of the long continuance of this malady. Among the lunatics at Bicêtre, in 1822, 1 had been there fifty-six years; 3, upwards of forty years; 21, more than thirty years; 50, upwards of twenty years; 157, more than ten years. Among those in the Salpêtrière, there were 7 cases upwards of fifty years; 11, from fifty to sixty; and 17, from forty to fifty. Although many live thus long in a state of insanity, yet the mean duration of existence is shortened by it, and chiefly owing to the following causes, each of which requires a brief consideration:— 1. By exhaustion of organic, nervous, or vital energy; — 2. By the progress of the morbid state of the brain, associated with the mental disorder, so as seriously to disturb the physical functions; — 3. By favouring the development of diseases of several vital organs; — and, 4. By the occurrence of accidental disorders which may be masked by the mental disease, or concealed by it, until it assumes a serious form. The mental disorder, however, is often *symptomatic*, or sympathetic — a consequence of disease more or less latent, of some important abdominal or thoracic viscus, yet seriously affecting the constitution and nervous power; the physical malady being sometimes aggravated, and occasionally suspended for a time, by the sympathetic mental affection, but, nevertheless, terminating life sooner or later. This topic will be more particularly noticed hereafter.

209. *a. Exhaustion and depression of nervous or vital energy may proceed so far as to fatally terminate the insane state.* —This occurs chiefly in mania, wherein the inordinate excitement of the feelings, the constant agitation of both mind and body, the febrile disturbance of the system, and the continued want of rest and sleep, combine to exhaust the powers of life, and to occasion nervous depression and emaciation. In the majority of cases, the exhaustion either takes place gradually, or does not proceed so far as to endanger life; and the maniacal state passes either into recovery, or into dementia: sometimes, however, it is so extreme, or so complete, that the patient never afterwards rallies, but rapidly sinks to death. This occurs most frequently during the first two years from the commencement of the malady; and hence the greater number of deaths from mania, at this, than at any subsequent period. That this result should often follow, in cases where the excitement and general perturbation are great relatively to the amount of vital power, may be assumed *à priori*; and it is in these cases especially, that we find the organic lesions insufficient to account either for the mental disorder, or for the fatal termination. In extreme cases of melancholia, death may take place from depression, or sinking of nervous and cerebral power; and this state may be aggravated even to a fatal issue by a too depressing or exhausting method of cure, or from want of those means of restoration required by the peculiarities or exigencies of the case.

210. *b. The morbid state of the brain associated with the mental disorder may proceed so far as to seriously, and at last fatally, disturb the physical functions.* — In these cases, the lesions of the brain may vary remarkably in respect of seat, extent, and nature of parts implicated in them; and may commence gradually, and proceed slowly to fatal disorganisation, or may take place more or less suddenly, and terminate rapidly. In either case, we can observe only the ultimate and gross results in our examinations of the brain and its appendages after death; but there can be no doubt that these, during their development and increase, give rise to phenomena, several of which have been described when treating of the principal *complications* of insanity (§ 167. *et seq.*), — especially to the different forms of paralysis, to epilepsy and convulsions, to apoplexy, and to coma, either of which may terminate life.

211. *c. The development of serious diseases of vital organs seated in either the thoracic or the abdominal cavity, and even of the system generally, seems to be favoured by insanity*; and it is to these

diseases that a fatal termination is often owing. Many consider the occurrence of these diseases accidental; but they are so frequently observed among the insane, relatively to other classes of persons, that something more than chance is concerned in their production. As I believe that insanity — and particularly certain forms of it — is more or less connected with general debility of the organic nervous system, expressed more especially in the brain; so I consider that the functions, and subsequently the structure, of other important organs will suffer during the continuance of it, — particularly if any predisposition to disorder in these organs have already existed. And, accordingly, we find that those viscera most obnoxious to disease, especially in weakened states of vital energy, are the most frequently attacked. — *a.* Most writers and observing practitioners have remarked the great number of instances in which the death of insane persons was owing to *tubercular consumption* and inflammations of the pleura. In these cases, the pulmonary disease has generally proceeded in an insidious or latent form, until shortly before the fatal event has taken place. In many, insanity may be viewed as inducing a disposition to disease of the lungs, and as favouring the operation of its exciting causes, which may be more than usually influential and frequent in their operation during mental disorder. Dr. GREDING found that 40 out of 100 maniacs, and 20 out of 25 melancholics, laboured under phthisis; and that 74 of 100 maniacs, and 20 out of 24 melancholics, were found to have more or less effusion, either in one or both cavities of the thorax. This may be an extreme frequency of these complications, or be owing to local or peculiar causes; but there can be no doubt of their frequency. Insane persons affected by these diseases of the lungs, lose their strength, suffer slow or hectic fever, become emaciated, and at last have cough and shortness of breathing, with diarrhœa. In this state the insane symptoms rather increase than abate, and generally continue until death. In some cases, the pulmonary disorder precedes the mental disorder, or accompanies it. This is especially the case with melancholia, as remarked by M. ESQUIROL, and with hypochondriacal monomania. In these, the impairment of vital power affects both the lungs and the functions of the brain, and sometimes both nearly simultaneously.

212. *β. Diseases of the heart* and great vessels are also often concerned in hastening a fatal issue of insanity. M. FOVILLE states, that five out of six bodies display, upon examination after death, some organic disease of the heart and great vessels, — particularly hypertrophy of the heart. This is most probably owing, in part, as he supposes, to the violent efforts and agitation of insane patients.

213. *γ.* Although *diseases of the digestive organs* frequently exist previously to the appearance of insanity, and are often more or less concerned in causing it, yet they often do not become objects of attention until after it has fully declared itself; when, from their nature or severity, they obtrude themselves upon the notice. Whether the disorder consist of gastro-intestinal irritation or not, at the commencement, it frequently passes into it; and, at last, terminates in ulceration, originating chiefly in the mucous follicles, or in abrasion of portions of the mucous membrane. At the beginning of the mental disorder, and particularly of melancholia and mania, constipation is both obstinate and of long continuance; the most drastic or active medicines being required to act upon the bowels. But it generally at last gives way, and is followed by, or alternates with, diarrhœa, which sometimes passes into dysentery, and which rapidly exhausts the strength of the patient, without abating the mental disorder.

214. *δ.* The *cachexia* already noticed, frequently associates itself with other maladies, in causing a fatal termination of insanity, and particularly with disease of the alimentary canal, and enlargement, obstruction, torpor, and congestion of the *liver*, and even also of the *spleen*. In many cases, this state of cachexia is evinced by a sallow, lurid, dirty, and scaly state of the skin; and by papular eruptions or discoloured patches. It sometimes proceeds to more obvious disease of the fluids and soft solids; furunculi and carbuncles break out in different parts of the body, and sometimes slough extensively; the gums become spongy and sore, and bleed upon the slightest irritation; livid blotches occasionally appear on the lower extremities; and complete scurvy at last supervenes. In other cases, emaciation, occasionally amounting to marasmus, a cold and clammy state of the general surface, diarrhœa, and colicky pains in the abdomen, take place, either with or without the more obvious indications of scurvy; and the patient sinks from the gradual decay of vital power, and the effects of this decay upon the digestive, the assimilative, and nutritive functions. These cases are most frequently met with in dementia and chronic mania, — the mental faculties indicating a failure of the vital manifestations of the brain, altogether similar to that of the other important organs of the body.

215. *d. There are other maladies of more accidental occurrence, which often terminate the life of the lunatic.* — These, as well as the most of those just noticed, may be masked by the mental disease, or entirely concealed by it, until they reach a serious or even dangerous form, or they may not be detected until disclosed by a *post mortem* examination. The complaints of the patient even are often overlooked and taken for delusions. This is especially the case in hypochondriacal monomania, and melancholia. But the truly observing physician will frequently recognise, in the delusions of the insane, bodily disease of a serious nature. Several of the delusions already noticed, have been shown to depend upon contingent organic lesion of a vital or important organ. Sufficient proofs of the truth of this have been adduced above (§ 21.); and I need not further allude to this topic, than to press the importance of this connection, and the necessity for carefully ascertaining what connection may exist between the illusion entertained and visceral lesion. Many of the diseases which may be viewed as accidental only as respects their occurrence in lunatics, may, in some degree, be owing to the physical state of these individuals; inasmuch as they are more frequently attacked by these diseases, and suffer more severely from them than any other class of persons. — Fevers and chronic inflammations are often met with among them; the former generally assuming a typhoid character with predominant cerebral affection, and frequently terminating fatally; the latter often giving rise to effusion, and causing death in consequence.

216. *e.* The *diagnosis of visceral diseases in lunatics* is remarkably difficult, owing either to the unfounded complaints made by them under the influence of fancied and erroneous sensations, or to the extent to which the mental disorder masks the physical disturbance. Many lunatics labour under severe diseases, without evincing them by any expression — because either these diseases do not occasion much suffering, or the disturbed state of their minds prevents the morbid sensation from being perceived. In this latter respect, the diseases of lunatics are more obscure than those of infants, because the latter express their ailments by their cries and attitudes. M. GEORGET justly remarks, that, where we observe a lunatic, who had previously been agitated and furious, become morose and taciturn, and at the same time lose his appetite, seek repose, and display a suffering and dejected expression, we ought to examine him carefully, for he is attacked with acute disease. The development of symptoms will soon point out the seat and nature of the malady. But chronic affections are so slow in their approach, and so latent in respect of their symptoms, that they often reach a very advanced stage before their existence is suspected, unless a careful examination had been made before, as well as after, their commencement. This is especially the case in regard of diseases of the lungs, heart, pleura, and of the organs of digestion. From this it is manifest that insane persons should be carefully watched and examined, and that the states of the lungs and heart should be investigated from time to time by percussion and auscultation.

217. *f.* The *rates of mortality* among lunatics have received much attention from M. ESQUIROL and Mr. FARR; the former of whom states, that the highest rate, for the two sexes, is between the ages of 40 and 50: that of women is greatest between 50 and 60; that of men between 40 and 50. A greater number of men than women die insane; and this is partly owing to the greater frequency of the more dangerous complications in the former than in the latter. M. ESQUIROL concludes, from a comparison of different hospitals, the deaths to be — in *mania*, 1 in 25; in *monomania*, 1 in 16; in *melancholia*, 1 in 12; and in *dementia*, 1 in 3. He further states, that a greater number of deaths take place in December, January, and February, than in any other three months. Mr. FARR states, that the mortality furnished by Bethlem, St. Luke's, and the Asylums at Stafford, York, Lincoln, Gloucester, and Hanwell, amounted to 10·40 out of 100 treated; that the annual mortality among lunatics was 9 per cent.; and that the mean ages of those admitted at Bethlem varied from 36 to 39. That no precise idea can be formed, however, from these data, of the mortality of the insane, is evident from the fact, that two of the principal of these institutions do not admit any but recent cases, and that they do not allow these cases to remain longer than one year. Enough, notwithstanding, is adduced to prove that *insanity remarkably shortens the mean duration of life.*

218. Considerable difference exists in estimates formed by writers of the numbers of deaths from the prevailing diseases among lunatics. Indeed, no precise data can be furnished on this point; for those who parade numerical data or details in this, as well as in other maladies, by no means satisfy us in what manner those details have been obtained. Numerical results, unless furnished by the ablest and most discriminating observers, and with the utmost accuracy and good faith, may mislead more than instruct: and this is a subject on which it is next to impossible to furnish them with precision. Besides, the comparative prevalence of fatal diseases in lunatics will necessarily vary in different places, with numerous related circumstances and contingencies. The diseases, also, of the insane are often so complicated, that different observers may impute the fatal result to different affections or lesions even in the same cases, although the matter may seem to have been placed beyond dispute by a *post mortem* examination. Thus, tubercular formations in the lungs and extensive ulcerations in the bowels will often be found in the same case; or disease of the liver, lesions in the brain, and inflammation of the peritoneum, or of the pleura, in another; or changes in the heart, effusions into the cavities, and lesions of some other organ, in a third: and hence different physicians may ascribe death to very distinct organic changes. Some, even, satisfied with the alterations presented by one vital organ, may leave other important viscera either entirely unexplored, or insufficiently investigated, although they may be equally, or even more, affected.

219. Notwithstanding these objections, it may be conceded that the most fatal maladies among the insane occur nearly in the following order as to frequency: — More or less sudden deaths from apoplexy, coma, and convulsions; — pulmonary and pleuritic lesions; — nervous, typhoid, adynamic, and putro-adynamic fevers, usually with predominant affection of the brain; — general palsy; — general cachexia, frequently with colliquative diarrhœa; — organic lesions of the liver, bowels, and mesenteric glands, causing marasmus, &c.; — exhaustion of vital power without sufficient alteration of structure to account for death; — structural change of the heart, &c.; and dropsical effusions into shut cavities, particularly the pleural and pericardiac; — mortification, chiefly of parts pressed upon, and of the extremities; — organic changes in the stomach and pylorus; — chronic peritonitis, generally latent; — alterations of the uterus, spleen, and pancreas, &c. Organic lesions of the brain, lungs, heart, and digestive organs are found variously associated, in most cases, upon examination after death; those of one organ predominating over the rest in different cases, and seldom presenting a due relation to the symptoms or disorders complained of, or manifested during life. Diseases in the abdominal organs, and particularly in the intestinal mucous surface, are amongst the most frequent morbid associations of insanity, but generally contingent upon it, and not until an advanced period of its progress; although, as will appear in the sequel, they are also important physical causes of it. M. ESQUIROL observes, that of upwards of 600 examinations after death, three eighths die of diseases of the abdomen, two eighths of diseases of the chest, and three eighths of alterations of the brain and membranes. The proportion here assigned to the first class of diseases is probably too high, and especially in respect of this country. A very able writer remarks, that the reports of lunatic asylums partly show, that the corporeal ailments, under which the patients languish and die, are very often overlooked, and are

consequently not met by proper treatment; and that these establishments are made a kind of show-houses, instead of being hospitals for the complicated diseases which involve the functions of the mind. "We grant," he goes on to state, "that the mental malady may often be but the first sign of that total impairment of the frame which phthisis, or hydrothorax, or scorbutus, or paralysis, or marasmus afterwards more plainly declare; but we suspect there are cases in which, if the life of the patient were preserved through some of the maladies supervening on the mental disorder, the mind would be found to be restored, and the malady to be critical. With the present management of lunatic hospitals, these conjectures can neither be verified nor refuted. In many of them, medical aid is considered to be nearly superfluous; and in some, we are informed that the appointment of physicians in ordinary has been, if not rejected by the governors, at least, subjected to grave debate, as if the County Asylum were no more than a supplementary county jail." (*Brit. and For. Med. Rev.* No. xiii. p. 30.).

220. M. ESQUIROL gives the following tables of the mortality in insanity, according to the ages:—

	BICÊTRE. No. of *Men* admitted from 1784 to 1794, 2405.	SALPÊTRIÈRE. No. of *Women* admitted from 1804 to 1814, 2804.
20 to 30	25	58
30 to 40	176	83
40 to 50	215	143
50 to 60	134	173
60 to 70	90	123
70 and upwards	45	210
	685	790

Table of the Mortality at the Sâlpetrière during 10 Years.

No. admitted each Year.	1804	1805	1806	1807	1808	1809	1810	1811	1812	1813	Total.
271	46	21	15	8	1	6	2	1	1	1	102
301	—	48	29	16	7	2	4	1	—	2	109
292	—	—	49	22	9	2	1	4	2	1	90
297	—	—	—	64	25	3	2	2	4	1	101
252	—	—	—	—	35	23	8	1	3	1	71
299	—	—	—	—	—	35	31	7	3	1	81
260	—	—	—	—	—	—	30	22	9	3	64
233	—	—	—	—	—	—	—	26	20	9	55
301	—	—	—	—	—	—	—	—	23	10	33
298	—	—	—	—	—	—	—	—	—	26	26
2804											738
Deaths during this period amongst those admitted before 1804											52
											790

Of 790 deaths at the Salpêtrière, from 1804 to 1814, 382 occurred in the first year after admission, 227 in the second, and 181 in the seven following years.

221. The table of deaths from insanity, and from the diseases of the brain most nearly allied to insanity (p. 475.), is made up from the "*Abstracts of the Causes of Deaths registered in England and Wales, from 1st of July to 31st of December, 1837, both inclusive.*" These abstracts, and the remarks accompanying them, by Mr. FARR, are extremely valuable to medical men. It is to be hoped, that the reports of the register general will appear annually. Mr. FARR states, that the insane, who die in lunatic asylums, have often been registered improperly under secondary diseases, such as apoplexy and diarrhœa. Under the head of violent deaths are included suicides, accidents, &c.; and it cannot be doubted, that the great majority, at least, if not the whole, of suicides, are instances of some form or grade or other of insanity.

222. V. OF THE ALTERATIONS OF STRUCTURE CONNECTED WITH INSANITY. — It is evident, even from what I have already stated, that few diseases are connected with so great a diversity of structural changes as insanity; and there is none which has given rise to so much discussion and difference of opinion as to the nature of this connection, as it has occasioned. It has even attached to itself a very particular interest at present, owing partly to its importance, and partly to the very opposite views entertained respecting it by some of the most experienced of recent writers on mental diseases. — But little information was furnished on this subject previously to the almost contemporaneous publication of some cases, with the *post mortem* appearances, by MORGAGNI and MECKEL. — BALLONIUS, and long afterwards BONET, had furnished a few particulars; but these were rather of lesions found in the thorax and abdomen, than of changes within the head; and it was not until the investigations of GREDING, MARSHALL, and HASLAM appeared, that the appearances of the brain in fatal cases of insanity received any degree of attention. More recently, the researches of PINEL, ESQUIROL, GEORGET, BAYLE, LALLEMAND, BOUILLAUD, NEUMANN, GUISLAIN, CALMEIL, and FOVILLE, have been most assiduously directed to this interesting subject; still the results furnished by them are of such a kind as to prove the necessity for further investigation, carried on independently of preconceived opinions. Although British writers have hitherto contributed but little to this department of medical knowledge, it is to be hoped that those who have the management of public institutions for insanity in their hands, will see the advantages which will result contingently even to those connected with themselves,—will catch a glance of their own interests prospectively,—from the encouragement of researches into the pathology and treatment of the most distressing of all maladies, not merely for the benefit of the few subjects of the maladies to whom they are guardians for a time, but also for the instruction of those to whom the community have to look for aid in these calamities, and, consequently, for the advantage of all classes in society.

223. i. MORBID APPEARANCES OBSERVED IN THE HEAD. — *A.* The *cranium* seldom presents any change from the healthy *shape*, excepting in epileptic or idiotic lunatics. GREDING states, that of 220, only 16 had the forehead contracted, the temples compressed, and the occiput large and expanded. In a few, the head was elongated and compressed laterally. In some, the head was almost round, or of a square shape: these were chiefly epileptic lunatics and idiots. I have observed, in this class, one side of the head higher than the other, and sometimes also more prominent, whilst the other side receded, giving rise to the *diamond-formed obliquity* or deformity of the skull described by me in the article CRANIUM (§ 9.). Of 26 cases, including epileptic lunatics and idiots, GREDING observed 2 belonging to these latter, with very small and quite circular heads. Of the whole number of cases (220), the skull was unusually thick in 167: this was

TABLE OF DEATHS FROM INSANITY, AND FROM DISEASES MOST NEARLY ALLIED TO IT, IN ENGLAND AND WALES, *from 1st of July to 31st of December, 1837, inclusive.*

NAMES OF PLACES.	AREA, in Acres.	POPULATION according to the Census of 1831.	INSANITY.			DELIRIUM TREMENS.			CEPHALITIS.			PARALYSIS.			APOPLEXY.			EPILEPSY.			DISEASE of the BRAIN.		
			Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
The Metropolis, and parts of Middlesex, Surrey, and Kent - - - - - - - -	44,810	1,594,890	38	39	77	30	4	34	159	135	294	161	176	337	259	230	489	64	43	107	91	71	162
Manchester and Salford - - - - -	37,797	236,935	1	1	2	0	0	0	9	14	23	23	17	40	25	6	31	3	4	7	10	8	18
Liverpool and West Derby - - - - -	38,060	218,233	8	1	9	0	0	0	7	6	13	22	13	35	34	17	51	6	7	13	2	5	7
Leeds - - - - - - - - -	41,520	135,581	1	0	1	1	0	1	11	9	20	1	7	8	13	10	23	0	1	1	16	9	25
Birmingham - - - - - - - -	2,660	110,914	5	5	10	1	0	1	5	3	8	8	13	21	14	11	25	4	2	6	5	5	10
Part of Middlesex, Hertfordshire, Buckinghamshire, and Bedfordshire - - - - - -	1,323,888	515,893	9	4	13	4	1	5	21	18	39	28	27	55	60	61	121	11	19	30	8	17	25
Kent, part of Surrey, Sussex, Hampshire, and Berkshire - - - - - - - - -	3,861,100	1,351,236	16	14	30	9	0	9	53	37	90	95	107	202	188	168	356	30	32	62	66	35	101
Dorsetshire and Wiltshire - - - - - -	1,407,913	373,797	3	3	6	2	0	2	10	6	16	42	44	86	33	37	70	9	12	21	5	3	8
Devonshire - - - - - - - -	1,691,572	503,118	3	2	5	4	0	4	21	11	32	39	32	71	61	64	125	12	8	20	14	12	26
Cornwall - - - - - - - -	866,474	304,785	1	1	2	0	0	0	8	5	13	18	30	48	25	30	55	1	6	7	4	4	8
Somersetshire - - - - - - - -	987,087	451,252	5	2	7	3	0	3	17	14	31	22	27	49	42	29	71	8	6	14	17	11	28
Essex - - - - - - - - -	928,589	304,315	0	6	6	2	0	2	12	9	21	18	17	35	32	35	67	8	11	19	8	5	13
Norfolk and Suffolk - - - - - - -	2,118,867	682,788	7	15	22	2	0	2	21	15	36	39	63	102	58	59	117	11	9	20	11	14	25
Cambridgeshire, Huntingdonshire, and South Lincolnshire - - - - - - - - -	1,295,379	311,714	0	0	0	2	0	2	7	8	15	22	13	35	24	22	46	4	9	13	5	7	12
North Lincolnshire, Rutlandshire, Derbyshire, Nottinghamshire, Leicestershire, and Northamptonshire	3,936,980	1,045,133	5	7	12	5	0	5	18	27	45	65	78	143	96	72	168	20	21	41	33	26	59
Oxfordshire, Gloucestershire, Worcestershire (except Dudley), and Warwickshire (except Birmingham) -	2,355,462	977,108	13	8	21	4	0	4	41	33	74	63	83	146	104	87	191	12	21	33	50	32	82
Mining parts of Shropshire, Worcestershire, and Staffordshire - - - - - - - -	140,798	223,457	2	1	3	0	0	0	9	7	16	9	11	20	11	21	32	3	2	5	5	4	9
Cheshire, Shropshire, and Staffordshire (except mining districts) - - - - - - - -	2,216,515	721,555	8	12	20	3	3	6	26	11	37	45	51	96	64	60	124	13	19	32	14	14	28
Lancashire (except Liverpool and Manchester), south of Morecambe Bay - - - - - -	1,131,270	905,501	9	6	15	1	0	1	36	22	58	58	50	108	69	44	113	15	14	29	10	6	16
West Riding of Yorkshire (except the northern part thereof, and Leeds) - - - - - -	1,250,530	773,254	4	4	8	4	0	4	26	27	53	33	21	54	40	42	82	12	9	21	18	10	28
City of York, and East Riding of Yorkshire - -	730,945	199,515	0	2	2	2	0	2	8	4	12	10	13	23	34	28	62	9	12	21	5	3	8
Durham, and the North Riding of Yorkshire, with the remainder of the West Riding (except the mining part) - - - - - - - - -	2,104,736	319,042	1	2	3	4	0	4	12	8	20	23	31	54	41	36	77	7	4	11	9	10	19
The mining parts of Northumberland and Durham -	88,708	318,941	1	2	3	0	0	0	20	12	32	57	34	91	40	30	70	0	1	1	10	5	15
Cumberland and Westmoreland, with the remainder of Lancaster and Northumberland - - - -	1,590,448	338,273	1	0	1	0	0	0	13	7	20	33	22	55	21	26	47	3	4	7	8	7	15
Wales, Monmouthshire, and Herefordshire - -	- - - - -	1,016,219	6	1	7	3	1	4	7	6	13	73	72	145	60	39	99	13	16	29	14	3	17
England and Wales - - - - - -	Area in Sq. Miles. 57,805	13,897,187	147	138	285	86	9	95	567	454	1021	987	1052	2039	1447	1264	2711	278	292	570	438	326	764

observed in 78 out of 100 cases of mania, and in 22 out of 30 idiots. In some cases, the cranium was remarkably thin. Numerous foramina were observed in the inner table of 115 out of 216 cases; and, in some instances, bony projections arose from this table. Similar changes in the cranial bones were noticed by Neumann and Georget, — the latter of whom has inferred hypertrophy of these bones to be still more frequent in lunatics than stated by Greding. The bones of the head have likewise been observed more vascular than natural by Calmeil and others. (See art. Cranium, § 9—12.)

224. *B.* The *membranes of the brain* are frequently altered. — *a.* Greding found the *dura mater* adherent to the cranium in 107 out of 216 cases; in a few instances, of a bluish black colour, thickened, and containing ossific deposits. Similar lesions were observed by M. Georget, who also detected the *arachnoid* sometimes thickened, but smooth, and occasionally presenting, in places, additional lamina of a red or grey colour. The *pia mater* was, according to this pathologist, injected, thickened, and infiltrated with serum, giving it at first the appearance of a gelatinous deposit. Greding found it thickened and opaque in 86 out of 100 cases of mania, and beset with small spongy bodies in 92 out of 100; these bodies being united to the surface of the brain, and in some instances containing ossific matter. M. Calmeil has described these excrescences, granulations, or spongy bodies, to arise or grow from the pia mater so as sometimes to penetrate the dura mater and cause absorption of the inner bony surface of the cranium: and he has remarked, that infiltrations and thickenings of parts are almost constantly found under these excrescences. The above changes in the membranes, and particularly in the arachnoid, have been recorded also by Haslam, by Guislain, and by M. Bayle. To these alterations, and to effusion of serum between the membranes and in the ventricles, this latter physician ascribes the chief phenomena characterising and contingent upon insanity.

225. *b. Effusions of serum* between the dura and pia mater were observed by Greding in 120 out of 216 cases of insanity, and in 58 out of 100 maniacs; and between the pia mater and surface of the brain, in 28 out of 100 cases of mania. The lateral ventricles were full of serum in 29 instances, and remarkably distended in 23. They were equally distended in 10 amongst 24 cases of melancholia. The third ventricle was quite full in 57 out of 100 maniacs, and in 16 out of 24 melancholics. The fourth ventricle was distended to the utmost in 80 out of 100 maniacs, and quite empty only in 3. It was greatly distended in every one of 24 melancholics examined. Dr. Haslam found serum effused between the membranes in 16, and in the lateral ventricles in 18, out of 37 cases. Effusions between the membranes and in the ventricles were met with also by MM. Georget, Guislain, and Bayle, — the last of whom ascribes insanity to inflammatory irritation of the membranes; effusion following upon the inflammation, in his opinion, and occasioning the cessation or diminution of maniacal violence, the great loss of power in the intellectual faculties, and the commencement of general paralysis, owing to the pressure caused by the effusion. According to this view, the progress of dementia, fatuity, and general paralysis indicates a corresponding increase of effusion and of pressure on the brain. Other writers, who differ from M. Bayle as to the origin and seat of insanity and general paralysis in chronic inflammation of the membranes, and of serous effusion from them, readily admit the great frequency of these lesions. Lallemand, Calmeil, Bouillaud, Casauvieilh, and Foville have all described similar changes to the above; but have viewed them more in connection with alterations in other parts, and estimated them differently.

226. *c.* The *choroid plexus* was found in a healthy state by Greding in 16 cases only out of 216, and thickened and full of hydatids in 96 out of 100 maniacs. M. Georget has remarked that the choroid plexus was exsanguineous, and contained hydatidiform vesicles.—The *lateral ventricles* were in some instances very small; but, much more frequently, large, and distended, as just stated, with serum, which was remarkably clear and limpid. — The *convolutions* of the brain were often observed, by M. Georget, separated by an effusion of serum, and the pia mater thickened.

227. *d.* M. Foville states, that, in acute cases, the morbid appearances discovered in the meninges were chiefly injection of the pia mater; and that this injection was generally proportioned to the degree of inflammation existing in the cortical substance of the convolutions. The small arteries and veins passing from the membrane and penetrating the grey matter were distended with blood: the arachnoid, in these cases, generally retains its natural aspect. The chronic changes in the membranes, according to this observer, consist for the most part in opacity, increased consistence, thickness of the arachnoid, the formation of granulations and false membranes on its surface, and the effusion of serum into the cellular tissue of the pia mater and into the ventricles. The arachnoid is often, in patches or more extensively, of a pearly whiteness. The opacity of this membrane is always attended by thickening; and in the place where the arachnoid and pia mater are naturally contiguous, they are found to be adherent. The opaque patches result from the deposition of albumen upon the arachnoid.

228. *C.* The *substance of the brain* has been more closely examined in cases of insanity, in recent times, than heretofore. Indeed, the progress that has lately been made in the minute anatomy of this organ, will necessarily enable the pathologist to recognise many lesions of its structure, which were entirely overlooked in former times. The researches of M. Foville into the state of the brain in persons who have died insane, are of great importance, and were carried on by him in the Sâlpetrière, aided by MM. Delaye and Pinel Grandchamp, and subsequently in the extensive hospital of St. Yon, near Rouen, which is under his care. The morbid appearances which I proceed to describe, as having been observed in the brain, are chiefly the results of his investigations.

229. *a.* The *grey substance of the brain* presents, in the most acute cases, on the removal of the membranes, intense redness of its surface, approaching to that of erysipelas. This is still more marked in the substance of the cineritious tissue itself; and it is more striking in the frontal region, than in the temporal and lateral lobes,—and in the higher regions, than in the posterior parts. — In *acute cases* of insanity, M. Foville states that

the changes in the grey matter consist of uniform and intense redness of colour, with numerous mottled spots, varying from a bright to a violet red, and bloody points or minute extravasations of blood; of diminished consistence of this structure, coincident mostly with a slightly increased consistence of its surface; and of dilatation or enlargement of its vessels. He has never observed, in these acute cases, adhesions of the membranes to the cortical substance, which are very frequent in chronic cases. To this circumstance he ascribes the curability of recent cases, and the incurability of dementia, and chronic cases.

230. In these latter cases, the grey or cortical substance becomes much firmer, and dense, in the superficial part; and this part, owing to its uniformity, constitutes a distinct lamina, smooth externally, but irregular internally; of a lighter colour than usual; and admitting of being torn or peeled off, leaving the remainder of the grey substance red, soft, and mammillated. Sometimes this pale and dense surface, or part of the cortical substance, is rough and granulated, containing small grains of a yellowish white. In conjunction with these, the volume of the convolutions remains natural, or is lessened or atrophied. When it is the latter, linear depressions or irregular pittings exist on the surface of the convolutions; and in the grey substance itself, small yellowish lacunæ, filled with a yellowish serum, are found. These lacunæ are supposed to correspond with, or to be the remains of, the minute extravasations observed in acute cases. In other instances, the diminution of volume is a real atrophy of the convolutions, which appear thin and angular, as if pinched up towards their extremities. This change is very frequent in the frontal regions of the hemispheres, and often particularly comprises three or four convolutions in each side of the sagittal suture, — a chasm, filled with serum, occupying the place left by the absorbed substance. Coexistent with this alteration, is often observed a limited atrophy of the cranium, or a circumscribed disappearance of the diploë, owing to which the external table approaches the inner, leaving a superficial depression. In this atrophy of the convolutions, the diminution of substance is confined frequently to the cortical or grey matter; what remains of it being harder than natural, and sometimes presenting, on close examination, a fibrous structure. It is also of a darker colour, and occasionally seems separable into layers, — the exterior being pale, and the interior of a rose colour.

231. Softening of the grey substance is also often observed, in chronic cases of insanity, extending through its whole thickness, and not superficial merely. This softening is generally attended by a greater depth of colour, which often approaches to brown, and is frequently so great as to amount almost to liquefaction of this structure. This extreme and general softening of the cortical substance is not necessarily attended by a similar change of the white structure; but is sometimes conjoined with a hardened state of that structure. In these cases, the grey may be separated from the white substance by the effusion of water. These more extreme alterations are found, especially in the worst cases of dementia, complicated with paralysis and marasmus. MM. FOVILLE and CALMEIL have met with instances of this description, in which limited portions of the grey substance had disappeared previously to death. The grey structure in other parts of the brain does not present the same changes as have now been described as taking place in the convolutions; but generally exhibits alterations similar to those of the medullary or white substance. The cortical structure, however, of the cornu ammonis is in some cases softened, and in others hardened.

232. *b.* The *white or fibrous structure of the brain* is often found altered in colour, density, and texture. It is frequently injected, and its vessels more or less enlarged, exhibiting numerous bloody points on sections of it. In other cases, it has a mottled appearance, of a deep red or violet hue, owing, as M. FOVILLE believes, to a finer injection of its vessels, as shown by the magnifying glass. These injections of the white structure do not always coincide with similar injections of the grey substance. Sometimes the fibrous or white structure is splendidly white; and generally at the same time increased in density, or hardened. This induration occasionally amounts to an almost fibro-cartilaginous state. In two or three cases, I have observed the increase of density nearly to resemble the white kind of caoutchouc. The hardened fibrous structure, however, may not be remarkably white; it is sometimes of a yellowish, or of a greyish or leaden, tinge. M. FOVILLE accounts for the induration of this structure, by supposing that the cerebral fibres have contracted adhesions to each other, so as to render their separation impossible. According to him, the fibrous mass of the hemispheres consists of several distinct layers or planes of fibres applied one upon the other, and connected by very fine cellular tissue. These planes are easily separable in the healthy state, but become inseparable in the course of mania. The occurrence of tubercles and tumours in the brain is considered by him as accidental, when met with in cases of insanity.

233. *c.* The *cerebellum* undergoes alterations similar to those observed in the brain, but much more rarely.

234. *d.* The *nerves* sometimes present changes corresponding with disorders of sensation and perception. M. FOVILLE has found the optic nerves hardened, and otherwise altered, in persons troubled with hallucinations of sight.

235. *e.* The *morbid appearances found in cases of insanity complicated with general paralysis* have especially engaged the attention of M. CALMEIL. In this association of mental and of physical disease, it is very difficult to determine, as Dr. PRICHARD remarks, what alterations are connected with either morbid state; and certainly many of the changes met with by M. CALMEIL, in these paralytic cases, are similar to those regarded by various writers as connected with insanity, without reference to its association with paralysis. This pathologist concludes that general paralysis is not dependent upon compression of the brain by serous effusion, as supposed by M. BAYLE, but upon the disease of the encephalon which gives rise to the effusion, and chiefly on inflammation, of which the thickenings, and lesions, and vascular turgescence of the pia mater, and the peculiar condition of the grey structure, afford sufficient evidence. M. CALMEIL has succinctly enumerated the changes observed by him in the encephalon, in this class of complicated cases, nearly as follows: — Injection and absorption of the bony structure; injections of the

dura mater, separation of its fibres; effusion of serum into the cavity of the arachnoid; false membranes, organised or without organisation; cysts filled with blood in its two laminæ; simple hæmorrhages in the arachnoid; œdema of the meninges; injections and thickenings of the membranes; vegetations of the pia mater, and development of its vessels; adhesions between the pia mater and the convolutions; disappearance of the grey substance; softening, induration, and discolouration of this substance; hardening and injection of the white or fibrous structure; redness and tumefaction of the ventricular villosities; serous effusion into the ventricles; apoplectic cysts; erosions of the convolutions; softening of the brain, or of the spinal marrow. These changes are so various, and so far from uniform in occurrence, that they cannot satisfactorily explain the results imputed to them. M. Calmeil considers them all to be proofs of a chronic inflammation of the brain; and in this, as well as in his descriptions of many of the alterations, he agrees with M. Foville. This latter writer states that, in lunatics affected with general paralysis, he found the induration of the fibrous structure of the hemispheresd escribed above (§ 232.), wanting only in two cases, and in these the cerebral nerves, the annular protuberance, and the medulla oblongata presented extreme hardness. He states further, that this induration of the fibrous structure of the brain has been found in old men, whose voluntary movements have become uncertain or vacillating; but it has never been seen in lunatics whose muscular powers had remained unimpaired. I have observed induration of the spinal cord, with effusion of serum between the membranes, and other changes, in two cases of general incomplete paralysis unattended by insanity; both patients, however, having become delirious shortly before death.

236. The brain has occasionally been so infiltrated with serum, that the fluid has flowed from the surface of the incisions. This infiltration has been so remarkable in a few instances, as to constitute a true œdema of the brain. Much more rarely, as observed both by Esquirol and by myself, a multitude of pores or small cavities, containing a limpid serum, have been found in the substance of the brain; a section of the part thus changed resembling that of a porous cheese. In these cases, the brain may be also somewhat indurated and changed in colour. It is by no means determined, as some suppose, that these pores or cavities are the sequelæ of vascular extravasations. It is more probable that they are the consequences of softening; the pores being left by the removal of the molecules of the cerebral substance, which have lost their vital cohesion to the rest of the structure, and filled by a serous effusion.

237. *f.* The *inferences which may be drawn from these researches* deserve a brief notice. It will be seen from these, that M. Foville ascribes the morbid appearances to inflammation; and, in this, agrees with Calmeil and others. But it will be remarked by many, and not the less by those who may have read the article Inflammation in this work, that this term has been applied, and possibly is applicable, to several lesions, attended by changes in the state of capillary and vascular action, each differing more or less from the other, and accompanied with different, or even opposite, conditions of organic nervous or vital power; and that, although these lesions may be apparently quite similar, and be followed by nearly the same results, in different cases or persons, yet may the state of vital power or manifestation, in respect not only of the functions of the brain, but also of the whole economy, differ remarkably in each particular instance. It is well known that the lesions constituting, as well as consequent upon, several kinds of phlegmasiæ — upon phlogosis, or simple sthenic inflammation, and upon erysipelas and other forms of spreading or asthenic phlegmasia — nearly resemble each other; but they are attended by very different constitutional disorder; and this is independently of grades of activity or intensity of action. Besides, something should be attributed, in many cases, to the influence of the moral causes, and to the consequent mental excitement, upon the cerebral circulation, with reference not only to prolonged erethism or excitement of the capillaries distributed to the organ of mind, but also to constitutional or vital power, and to the various maladies of which the cerebral affection may be only a symptom, or sympathetic disorder. We know that, in other organs or parts, a prolonged irritation or excitement of their capillaries, by agents which excite chiefly the nerves supplying them, will so determine the blood to them, and so enlarge and develop their vessels, as to give rise to appearances which nearly resemble the consequences of inflammation. We find, moreover, that the most violent forms of mania and of delirium, and the most fatal when not judiciously treated, are actually those in which inflammatory appearances are the least evinced, or in which states opposite to inflammatory really exist. We find, also, lesions in the brain — whether inflammatory or not — equally extensive with those observed in the most general and complicated cases of insanity, and without any disorder of mind having existed during life. Can we, therefore, legitimately impute insanity, in all cases, to these lesions? or may not these lesions be just as legitimately imputed to the insanity? There is very probably a connection between them, in most cases; but neither the exact nature of the connection, nor the intimate relations and source of the morbid alterations observed, have been yet fully ascertained. This is, however, no reason wherefore we should altogether reject the conclusions at which able and experienced observers have arrived, until we obtain others upon which more implicit reliance can be placed.

238. The morbid changes in the encephalon, M. Foville infers to be the results of inflammation: intense, diffused, and general redness; in many cases, tumefaction; and, in passing to the chronic state, the formation of adhesions between the cortical substance of the convolutions and the contiguous membrane: besides this, adhesion of the different planes, or layers of the cerebral substance, to each other, in a certain number of cases. As the different traces of inflammation are more constant in the brain than in the membranes, M. Foville concludes that the essential change connected with insanity takes place in the brain, and that alterations of the membranes are only accidentally connected with it. Amongst the morbid appearances in the brain, lesions of the grey structure are considered by him as the most constant in connection with the mental disorder. Although M. Calmeil was inclined to ascribe loss of mus-

cular power to disease of this structure, M. **Foville** contends that the facts upon which he founds this inference do not warrant this conclusion. In all the cases of general paralysis he has examined, there was, besides the change in the grey structure, some alteration, either hardening, serous infiltration, or softening, of the white or fibrous substance; and in most cases, in addition to these, there were adhesions of the principal planes of the cerebral substance to each other.

239. From the circumstance of the grey substance of the hemispheres being found in a state of disorganisation or atrophy, in cases where intellect was abolished, and the fibrous structure being natural where muscular power was unaffected, as well as from the fact of lesions or wasting of this latter structure being observed where voluntary motion was lost or affected, M. **Foville** infers, that the function of the grey structure of the brain is essentially connected with the intellectual operations, and that the office of the white or fibrous part is subservient to muscular action; and consequently, that—1st, morbid changes in the former part are directly connected with intellectual derangement; and, 2dly, those in the latter portion are connected with disorders of the motive powers. He, however, admits, that in some affections of the maniacal class succeeding the action of debilitating causes,—as in the puerperal state,—nothing has been discovered in the brain more striking than its extreme and general paleness; and that, although some mottled appearances of a light red or rose colour are met with, these changes are too slight to be considered as idiopathic. M. **Foville** is therefore induced to consider this form of mental disorder to be symptomatic of some deep-seated disease of the uterus or abdomen. But, unfortunately for his argument, of several cases of puerperal mania which I have treated, I have not met with one that did present any serious or deep-seated disease in these parts. There can be little doubt, however, that the contradictory evidence given by different observers of the appearances of the brain in cases of insanity, is partly accounted for, as remarked by an able writer, by the existence of cases in which the affection of the brain is merely functional and sympathetic,—the primary disease being in some other organ, especially in some of the abdominal viscera.

240. The evidence of those who believe that insanity, although often connected with organic lesions of the brain, especially in protracted and extreme cases, does not necessarily depend upon them, requires some notice. Here the experience of M. **Esquirol** attaches to itself great importance. He remarks, that the bodies of lunatics offer numerous varieties as to the situation, number, and kind of morbid appearances, and that the lesions of the encephalon are neither in relation to the disorders of the mind, nor to the maladies complicated with it. Some lunatics, whose mental and bodily disease indicated extensive organic lesions, have presented slight changes in the brain; while others, whose symptoms had been less severe, have been subjects of great and numerous alterations. But even in the most protracted cases of insanity, no organic changes whatever have been traced, either in the brain, or in its membranes. He goes on to state, "that pathological anatomy is yet silent as to the seat of madness, and that it has not yet been demonstrated what is the precise alteration in the encephalon which gives rise to this disease." The various states of the brain, compatible with integrity of the mental faculties, have never been satisfactorily investigated, and probably will never be accurately ascertained; and it is by no means easy to distinguish, with sufficient precision, the appearances resulting from, or belonging to, concomitant maladies, from those which belong to the mental affection. M. **Esquirol** observes, that organic lesions of the brain are declared by symptoms distinct from the mental disorder; that chronic inflammation produces compression and paralysis, and paralysis results from cerebral hæmorrhage; and that tubercles, tumours, and softening of the brain have their peculiar symptoms, which cannot be confounded with mental alienation. Moreover, the sudden and instantaneous relief experienced, in some cases of madness, is not to be forgotten; nor the fact, that every part of the brain has been found altered, suppurated, destroyed, without chronic lesion of the understanding.

241. The maniacal form of insanity is rarely fatal, owing to any lesion of the brain; but from fever, phthisis, and other associated maladies, or from sudden exhaustion of the sensibility or nervous power necessary to life. In a case which terminated in this latter manner, no lesion was observed in the brain after death; and in a young woman, accidentally killed in recent and furious mania, the brain and its membranes were likewise devoid of change. When a case is watched during life, M. **Esquirol** thinks that the period at which the organic lesion of the brain commences, may be known by the symptoms. When mania has existed long, he is of opinion that the weakness of the last days of life disposes to local inflammations. Upon the whole, he concludes, that, notwithstanding the labours of MM. **Foville**, **Calmeil**, **Bayle**, and **Guislain**, the organic reason of mental derangement is still undeclared. "Thirty years ago," he adds, "I should have written willingly on the pathological cause of insanity: I will not now attempt so difficult a labour,—such are the uncertainty and contradictions in the results of the examination of the bodies of lunatics after death up to this day. But modern researches permit us to hope for more positive, clear, and satisfactory notions." In another place, he admits, that a difference in the results of researches may arise from the greater care with which the brain is now dissected, and the slightest changes observed; and that, at earlier periods of the investigation into the pathological anatomy of insanity, an account was kept only of obvious alterations.

242. Respecting this matter, M. **Guislain** appears to steer a middle course in his more recent work on Insanity. After various details, he concludes, that, in the greatest number of organic lesions of the brain, a moral origin and functional state of disorder, without alteration of structure, first exists; and that, when such alterations are present, they consist chiefly of whatever causes pressure of the brain, as effusion of serum, or of blood, lymph, or the formation of a false membrane; or of constriction of the organ by its membranes, which, in their state of engorgement, incarcerates, or strangulates, in some respects, the hemispheres; or of softening, or other disorganisation, to an extent that is incompatible with the due exercise of the

mental manifestations. He adds, that *induration* of the brain has been often observed by him, especially in the parietes of the lateral ventricles, and in the rachidian bulb, or upper portion of the medulla oblongata: that epileptic convulsions frequently attend it; that convulsions are often also caused by organic lesions of the membranes, and of the cineritious structure, but not constantly either by these, or by induration; and that they may occur even without any visible change of tissue. He concludes, that absence of organic alterations of the brain is indicated by the full possession of muscular action and motion, and that the existence of them is evinced by lesion of muscular motion and of sensibility — that simple disorder or excitement of the mental faculties, without dementia or palsy, exists independently of softening or compression of the brain; and that dementia or extinction of the intellectual powers may depend — 1st, upon sanguineous engorgement of the brain; 2dly, upon effusion of serum between the membranes or in the ventricles; 3dly, upon extravasation of blood between the membranes or in the substance of the brain; 4thly, upon softening of this organ; 5thly, on atrophy of it; 6thly, on induration of it; and, 7thly, upon exhaustion of its vital influence.

243. ii. Alterations in the Thoracic Viscera. — *A*. The *lungs* are diseased in a very large proportion of the cases of insanity which terminate fatally. The proportion has been differently estimated by the writers already noticed. M. Georget declares that he has found organic changes in the lungs in at least three fourths of the cases which he had examined; and phthisis to have been the cause of death in more than half the lunatics in Salpètrière. He describes the pulmonary disease as always chronic, and often so obscure as not to be detected until the body is inspected. In these cases, the patient neither coughs nor expectorates, and he makes no complaint: he wastes, gets weak; looseness or constipation succeeds; he dies; — these changes take place slowly. Yet, notwithstanding the absence of cough and expectoration, excavations are found in the lungs after death. But instances of latent phthisis occur independently of insanity. When, however, both maladies are associated, the latter is more frequently sympathetic, or dependent upon the constitutional disturbance caused by the pulmonary disease, than is generally supposed; and it then sometimes does not appear until the softened and absorbed tubercular matter has contaminated the circulation, and thereby disturbed the functions of the brain. I have observed in persons predisposed to insanity, as well as in others, that, when tubercles are developed in the lungs, and when softening and ulceration follow without any communication having been made with a bronchus, the progress of the disease is generally latent. The tubercular softened matter undergoes changes during its retention; causes thickening or condensation of the parietes of the cavity containing it, even whilst the cavity continues to enlarge, and, if it be not evacuated by the bronchi, neither cough nor expectoration will be present. But the constitutional disturbance caused by the accumulated matter, as well as by the organic lesion of the part containing it, and still more by the absorption of a portion of it into the circulation, will so disturb the organic nervous functions, as to occasion, first, functional disorder, and consecutively, even organic lesion of such organs as may be most prone to disease from either an original or an acquired predisposition.

244. *B*. The *heart* is often changed in structure, in fatal cases of lunacy. Indeed, all the lesions of which this organ is susceptible, have been found in the bodies of the insane; but hypertrophy, passive dilatation, and softening, of the parietes of the cavities, seem to be the most frequent. The proportion of cases in which organic alterations of the heart have been found, has been differently estimated by writers. Romberg (Nasse's *Archiv. f. Med. Erfahr.* 1817.) believed that five out of seven bodies present lesions of this organ; and M. Foville considered that five out of six display alterations either of it or of the great vessels.

245. iii. Alterations in the Abdominal Viscera. — *A*. The *digestive mucous surface* very frequently presents evidence of inflammatory action, especially as respects certain of the consequences of this state. M. S. Pinel met with inflammatory appearances in this situation in 51 out of 269 bodies of lunatics; and of these there were only 13 of disease of the other abdominal viscera. These appearances have been also observed in a number of cases by Prost, Percival, and Guislain. — The frequency of displacements of the *colon*, first insisted upon by Esquirol, and especially with reference to melancholia, has already been attended to (§ 119.); and has been remarked also by Bergman, Müller, Annesley, and Guislain. In most of the cases described by Esquirol, the displaced colon presented none of the consequences of inflammation. In some of the instances observed by Percival and Bergman, the colon was contracted or more or less reduced in calibre through a great part of its length; in others, it was in parts dilated and contracted, as well as displaced. M. Guislain attributes both the displacement and the contractions to inflammatory action; — the latter most probably arises from this cause; but the former cannot always thus be accounted for. From the few instances which I have had an opportunity of observing, and from the history of many of those which I have seen recorded, it seems probable that most of the changes observed in the colon have been consequent upon asthenic inflammatory irritation, with diarrhœa, and occasionally with a dysenteric or an irregular action of the bowels, which had existed at some time or other during the course of the mental disorder, and especially at a late period of its progress. Dr. Percival (*Dublin Hospital Rep.* vol. i. p. 144.) observes, "that, on the dissection of cases of insanity which have terminated fatally from chronic diarrhœa, the intestines generally exhibit an extensive mass of disease. The mucous membrane is inflamed, thickened, and partially eroded, and the area of the canal diminished, often considerably, in the lower intestines." The mesenteric glands are often found more or less enlarged and indurated. In addition to these changes, hæmorrhoidal tumours and fistula in ano are not rarely met with in dissections.

246. *B*. Although much importance was formerly attached to disorders of the *liver* in causing insanity, yet the researches of recent writers do not tend to confirm the frequency of this connection. Esquirol, S. Pinel, Guislain, and Foville

found comparatively few cases which presented organic changes in the liver and biliary apparatus. It is probable that lesions of the liver, in connection with insanity, are more frequent in this country than in France, when we consider the influence of the abuse of ardent spirits in causing both insanity and liver diseases. In a case attended by Dr. Sutherland and myself, at the time of writing this, the liver is greatly enlarged. The frequency, indeed, of biliary disorder in the insane cannot be doubted; and the occasional association of organic lesions of the biliary organs with mental disorder will be allowed. The chief doubt, in cases where these organs present alterations, will be as to the nature of the connection; for it will be admitted, that disease of the liver will sometimes affect the functions of the brain sympathetically, and that disease of the brain will exert a similar sympathetic influence upon the functions of the liver; and hence the priority of affection of either of these organs will not readily be ascertained.

247. *C.* Alterations of the *gall-bladder, calculi* in this viscus or in the hepatic ducts, lesions of the *peritoneum* and *omentum,* of the *mesentery* and *mesenteric glands,* of the *pancreas* and *spleen,* of the *kidneys,* and of the *uterus* and *ovaria,* have been severally found in the boidies of the insane, by Bonet, Schulze, Marcard, Oberteuffer, Piderit, Jones, Percival, Powell, Stark, and others; but these have probably been accidental lesions, although they may, in a few instances, have had some influence in causing mental disorder, particularly in persons otherwise disposed to it, by affecting the organic nervous energy in general, and especially that portion actuating the brain.

248. VI. Causes of Insanity. — Few subjects are of greater importance than a just recognition of the numerous causes of insanity,— of their individual and combined modes of operation,— of the influence they exert in various forms of succession, — and of the progressive changes they induce before the effect upon the mind is fully developed. And the importance of the matter is not limited to its bearing upon the treatment of the malady; but is even still greater in respect of prophylactic measures, and of rational plans of mental hygiene. In discussing this subject, I shall consider — *first,* the predisposing causes, or the numerous circumstances which render the mind more susceptible of, or prone to, disorder, than in its natural and healthy state; and, *secondly,* those causes which more immediately produce or excite the disorder. And it must not be overlooked, that whilst the individual influences comprised under the former class are often variously associated in creating a susceptibility or proneness to mental disorder, the occasions or causes belonging to the latter class frequently act also in conjunction, or in immediate succession.

249. i. The Predisposing Causes are the most important objects of study, particularly in respect of their bearing upon hygienic and prophylactic measures. The prevention of so terrible an infliction, as insanity is, must be even of more importance than its cure; since the person who has once been insane, seldom wholly regains his former social position, but is regarded with more or less suspicion, and a union with him is avoided by prudent families. The discussion of this class of causes assumes, moreover, increasing interest and importance, when we consider, that many of the circumstances comprised by it are of more frequent occurrence now than formerly, and are more influential in exhausting, weakening, and dissipating the mental powers in the present state of society, than in former epochs of civilisation; and that several of them may be even viewed as altogether arising out of existing social relations.

250. *A. Constitutional predisposition* is amongst the most predisposing causes of insanity. It may arise — *first,* from a certain conformation, temperament or physical and mental constitution, derived from the parents, — or, *secondly,* from an original predisposition or conformation, independently of disease in any of the parents, — or, *thirdly,* from a state of constitution gradually acquired, or arising out of the continued operation of causes which deteriorate or otherwise change the organic nervous and vital powers, and consecutively the digestive, assimilative, and effective functions. In the *first* of these modes, the predisposition is transmitted from the parents: in the *second* and *third,* it is generated *de novo,* and subsequently admits of transmission to the offspring, although not so certainly as in the first case.

251. *a. Hereditary predisposition.* — M. Esquirol states, — and the circumstance is confirmed by the observation of others, — that persons born before their parents had become insane, are less liable to mental disorder than those born after it has manifested itself; and he further observes, that the morbid tendency, or the actual disease, where it is transmitted hereditarily, is apt to show itself in different individuals of a family at a particular period of life. Instances illustrative of this latter circumstance have been adduced by him, and by Dr. Burrows, MM. Falret, Georget, and others. The hereditary predisposition to insanity, M. Esquirol observes, is not more surprising than the predispositions to gout, phthisis, or other diseases. It may be traced from infancy; and it even explains a number of caprices and irregularities which, at a very early period, ought to put parents on their guard against the approach of insanity, and to guide them in the education of their children. In such cases, the education should tend to render the body robust, and to give tone to the nervous system. The constitution of the offspring should be changed as much as possible, by placing them in circumstances different from those which surround them, or which have influenced the constitutions of the parents.

252. In some instances, one particular form of insanity is transmitted; either dementia, mania, melancholia, or states of mental disorder followed by suicide, being thus observed in the same family. The particular variety of insanity evidently depends upon the temperament, which, with the predisposition to this disease, is derived from the parents. Not only the same form of mental disorder, but also the same physical disease complicating it, or terminating it, are apt to appear in the same family, more generally, or even exclusively; yet there are frequent exceptions to this rule. Where an hereditary disposition exists, different grades of the disorder, rather than different forms of it, are commonly observed, — in one, merely various eccentricities; in another, partial disorder of the moral powers; in a third, disorder of the understanding; and, in a fourth, mania, dementia, &c. In families, also,

in which insanity is hereditary, there is occasionally observed a greater tendency to diseases of the nervous system, than in other families, — as, to epilepsy, chorea, convulsions, palsy, &c. Dr. PRICHARD justly believes that a constitutional tendency existing hereditarily, or arising in the other modes about to be pointed out, is more important, in respect of the frequent occurrence of insanity, than all the other causes taken together. It cannot be said, with propriety, alone to give rise to mental disease, without any exciting occasion; but, if it be very strong, mental disorder will follow the operation of ordinary or very slight causes.

253. Dr. BURROWS remarks, that ESQUIROL assigns only 152, out of 264 cases, in his private practice, to this cause; but that an hereditary predisposition existed in six sevenths of the whole of his own patients. The most exempt from this taint were those whose mental disorder had a sympathetic origin; as in puerperal mania. Out of 57 cases of this latter affection, he could trace an hereditary taint in only about one half. But, where it existed, the disorder was more apt to return. Dr. BURROWS considers that this cause is more common in the higher, than in the lower classes; as the former most frequently marry in their own rank, or even in their own families; and that wherever the system of clanship, or family connection, has been most strictly preserved, there it most prevails. Examples of this are said to have been numerous in the old Highland families of Scotland; and BOËTHIUS mentions some very stringent measures which they adopted, to preserve from hereditary maladies, or rather to prevent the procreation of those who might be tainted by them. That hereditary influence is less common in the lower classes, than in the higher, is shown by Sir W. ELLIS's report of the Middlesex Lunatic Asylum. There, only 214 cases, in which the disease was inherited, were ascertained, out of 1380 patients admitted; and for 125 of these cases, no other cause of the malady than this could be assigned. It has been supposed, that numerous instances of insanity occur among the Jews, from the circumstance of their having kept themselves more free, than all other races, and for a longer time, from intermarriage with strangers. I believe that mental disorders are frequent among them; but other causes may contribute to the frequency. Dr. BURROWS states, that the youngest insane patients he ever had, belonged to a family of this race; and that in it he has observed the father and mother and six of their children insane. He further remarks, that insanity is very prevalent among Quakers, who usually intermarry in their own fraternity.

254. It may be presumed, that, when an hereditary predisposition to insanity exists in both sides of a family, the risk to the offspring will be much greater, than when it is in one side only; and that, when this latter is the case, the child, who bears a very marked resemblance, in constitution and mental character, to the parent exempt from hereditary taint, will be most likely to escape the mental disorder; and the hereditary disposition will fail of being perpetuated by him, unless reinforced by a similar taint, by marriage. But the child that most resembles the tainted parent will be the most liable to experience, and to propagate, the mental malady.

255. There are two points respecting which opinions are often required from physicians,—namely, whether or not a person born of parents who have never themselves been insane, but who, one or the other, is descended from a family thus afflicted, may propagate the malady to his offspring? — and whether or not a child born before insanity had appeared in either parent, is as liable to become insane, as one born after the malady was developed? The *first* question, Dr. BURROWS believes, should be answered in the affirmative, because he has met with insane persons, neither of whose immediate parents had themselves been insane, but some of the progenitors, or an uncle or aunt, on one side or other, had been so afflicted. I have known cases, where the nearest progenitors to the patients, who had been disordered in mind, were grand-aunts or grand-uncles. The *second* question has been partly answered above, (§251.), by M. ESQUIROL. But Dr. BURROWS considers, that a child born, either before or after the accession of insanity in the parent, provided that parent's progenitors or relations of blood had been insane, is liable to the malady; but that, if the insanity of the parent were adventitious, and not hereditary, the child born before mental disorder had appeared, will not have it by inheritance: how far a child born after the occurrence of adventitious insanity, is liable to mental disorder, is decided with difficulty. This writer believes that, whether it be adventitious or hereditary, once occurring, the morbid diathesis is thereby stamped, or generated.

256. *b.* The offspring may possess a *connate predisposition* to insanity, although neither of the parents, nor of the grand-parents, nor any member of their families, had been the subject of it. BURTON long since remarked, upon the authority of the older medical writers, that the offspring procreated of parents when they were far advanced in age, are more subject, than others, to melancholy madness. There can be no doubt, that whatever produces enervation or debility in the parents, will occasion a certain amount of predisposition in their children to nervous affections and to mental disorder; and I believe that habitual drunkenness, or the abuse of spirituous liquors, by either parent, and especially by the mother during gestation and lactation, causes numerous diseases in the offspring, and more particularly disorders of the functions of the brain, and nervous system in general. It also is very probable, that the children of persons who have been weakened by premature or unnatural sexual indulgences and vices, or who are gouty, hypochondriacal, hysterical, or otherwise debilitated, will be more susceptible of the operation of the exciting causes, than the offspring of those who are constitutionally robust and healthy. M. ESQUIROL affirms, that many facts have been observed by him, proving, that a strong predisposition to madness has arisen from fright or terror sustained by the mother during pregnancy; and that marked cases of this kind occurred during the French revolutions.

257. It has been long and generally supposed that marriages within a confined circle, as between cousin-germans, have the effect of impairing both the mental and constitutional powers of the offspring. The opinion seems well founded, and is undoubtedly just, if the breeding in-and-in be continued for two or more generations. The children of such families often die in infancy or

early youth; are frequently scrofulous, and are liable to hydrocephalic and convulsive diseases; and, if they grow up, are frail in body and imbecile in mind, or predisposed to mental disorder. — It is doubtful how far the scrofulous diathesis may dispose to insanity; but I believe that it has a very considerable influence.

258. *c.* That there may be not only — 1st, *an hereditary*, and, 2dly, *a connate*, but, also, 3dly, *an acquired, predisposition of constitution* to insanity, I firmly believe. This last state is quite independent of the two former, and of temperament or diathesis, and is generally the result of the operation of debilitating causes during infancy, childhood, and the periods of puberty and early adult age. Indeed, many of the moral and physical exciting causes may have this effect, when acting in a slight but continued or constant manner. But there can be no doubt, that early indulgences; a tender, sensual, and luxurious education; vicious modes of early instruction; masturbation, and premature or vicious sexual indulgences; exhausting pleasures, and inordinate mental and physical excitements, relatively to the states of nervous and constitutional energy; and various other causes, which debilitate the frame, increase the general sensibility, and augment the susceptibility of the brain and nervous system, — will often develop, to a greater or less extent, a predisposition to insanity, which may be appropriately termed acquired.

259. It has generally been supposed, and poets have sung, that a great genius is closely allied to insanity. This is most erroneous. Persons with a too active and ill-regulated imagination are predisposed to mental disorder; but those who possess powerful intellects, and a vast range of powers and of intelligence, are much less disposed to it than others; and, if they have become insane, the causes have been of an energetic kind, and overwhelming from their activity or association.

260. *B. Temperaments, &c.* — Persons of the melancholic temperament are more liable to the melancholic states of insanity, than others; those of the nervous temperament, to mania, dementia, and monomania; and those of the sanguine, or sanguineo-nervous, or irritable temperaments, are attacked more frequently with mania, than with any other form of mental disorder. M. Esquirol observes, that, when persons of the lymphatic or phlegmatic temperaments, or of a pale exsanguineous habit of body, are affected with mania or monomania, dementia or incoherency is more liable to supervene in them, than in others. This form of insanity is also likely to follow in persons of a full habit of body, with a thick head and short neck. — Mental disease pursues a somewhat different course in persons of different temperaments. Choleric or warm constitutions, or those with black hair and eyes, and vigorous frames, become violently maniacal, but experience a shorter disorder, and more frequently terminating in a marked crisis, than others. Individuals of a fair, pale complexion, with light hair, fall more readily into chronic mental disease: the dark-haired are liable to become gloomy monomaniacs; red-haired lunatics are disposed to violence, and are treacherous and dangerous. He gives the following table of the general appearances of a number of lunatics: —

External habit of body	Of the medium fulness of habit	122
	Thin or emaciated	60
	Fat	6
Height	Tall	102
	Short	19
The eyes	Chestnut or brown	102
	Blue and light	98
	Black	17
The hair	Chestnut	118
	Fair or flaxen	39
	Grey or white (aged)	36
	Black	31

261. *C.* The *form of the head in lunatics* has attracted the attention of Greding, Pinel, Georget, Gall, Spurzheim, and others. M. Pinel believed that there are certain peculiarities in the shape of the skull, frequently observed in the insane, and particularly in cases of dementia and idiotcy. The two most prevalent forms which he specifies, are — 1st, a laterally compressed shape of the head, giving a very long diameter from the occiput to the forehead; 2dly, a short and almost spheroidal form, — the above diameter being shorter than usual. He could not, however, detect any mental conditions corresponding with these opposite shapes. M. Georget states the results of the examination of upwards of 500 heads in the collection of M. Esquirol. One half of these presented nothing remarkable, being regular and well formed. The other half were more or less peculiar in the form and appearance of the skull, and in the thickness, density, and organisation of the bones composing it. Some skulls were unequally developed, — one side being more arched and larger than the other, especially the right. Others were somewhat oblique, — one side of the head being too forward, and the other much behind. I have seen instances where these two malformations were conjoined. M. Georget found some skulls in this large collection, in which the antero-posterior diameter was not more extended than the lateral: in these, the cavity was much elevated, especially in the posterior part. The cavities of the base of the skull presented likewise inequalities: those of one side were sometimes larger than those of the other. Persons who have contracted heads, particularly as now described, not only are more liable to insanity, than those whose heads are well formed, but lapse more readily into a state of dementia or fatuity, and are consequently less curable than others. It is chiefly in these hopeless forms of general insanity that these irregularities of the form of the head are observed. In *idiots*, as I shall show hereafter, these malformations are still more remarkable.

262. *D. Sex.* — The ancients, and especially Cælius Aurelianus, supposed that insanity occurred more frequently in males than in females. Recent investigations, however, have shown this not to be generally the case, in modern times. Dr. Prichard quotes M. Esquirol, as stating the proportion of insane females in France, to insane males, to be 14 to 11. M. Voisin considers the proportion as 13 to 10. In all Italy, the proportion is different — it being about 5·65 males to 5·00 females. M. Guislain states, that in Holland and Belgium, the number of lunatic females, to males, is as 34 to 29. Dr. Prichard assigns the proportion in Great Britain and Ireland, of male to female lunatics, as 13 to 12; and observes that, in England, the number of insane men, compared with that of women, is more considerable than in Scotland and Ireland; and this excess on the side of the males is greater, according to Dr. Burrows, in the higher than in the lower classes of society.

M. ESQUIROL confirms this observation in respect of France; and further states that, in the North of Europe, — in Germany, Denmark, Norway, and Russia, — the proportion of male to female lunatics is as 3 to 2. Dr. JACOBI furnishes nearly the same results in regard of Prussia. In the United States of North America, the number of insane males is stated to be much greater than that of female lunatics. In the States of New York, Pennsylvania, and Connecticut, the proportion of the former to the latter is nearly 2 to 1. In summing up the results of his inquiries obtained from various parts of the civilised world, M. ESQUIROL finds that the general proportion of insane males to females is about 37 to 38.

263. The occurrence of insanity among females is partly owing to the nature and vices of their education; to their greater sensibility and keener feelings; to the restraints imposed upon their desires and emotions; to the crosses, chagrins, and disappointments to which they are liable; to reading romances and novels, and thereby exciting the imagination, without improving the reasoning powers; to the addiction to music, and the want of salutary and invigorating occupations; and to the life of celibacy they are often doomed to lead. These, and various other moral causes, about to be noticed, contribute remarkably to the production of insanity among females.

264. The physical causes also operate energetically in producing insanity among this sex; but they are chiefly disorders of the sexual organs. Irritation of the uterus, or of the nerves supplying it, and its appendages; suppression, retention, or inordinate flow of the menses; and various organic lesions of these parts; have a very marked influence, sympathetically, upon the functions of the brain. Many of the moral causes, and emotions of mind, have but little influence, until they have first disordered the functions of the womb; and as soon as this organ is disordered, it reacts upon the brain, and heightens the effects of the moral emotions. In such cases, as well as in many others common to both sexes, the moral causes are often insufficient to induce the mental disorder, until they have first occasioned physical disturbance in some organ; which disturbance, from its sympathetic influence upon the brain, becomes an additional cause of the disorder. Females, however, are often so circumstanced as to experience very serious disorder of the circulation of the brain, from energetic mental emotions, occasioning an immediate effect upon the manifestations of this organ, before any disorder can appear elsewhere. And, in some cases, the consequent disorder is produced almost simultaneously in both the brain and the functions or state of the uterus. We observe this especially in the puerperal states, and, still more particularly, soon after delivery.

265. M. ESQUIROL remarks, that females become insane at an earlier period of life, are more liable to lapse into dementia, and are more disposed to religious insanity and to erotic delirium, than males; and that all varieties of insanity, in them, are generally complicated with hysteria. Males, on the other hand, are more liable to mania and violence; they are more dangerous, and more difficult to restrain: women are more noisy; cry, and talk more; are more dissembling, and less readily confide in those about them.

266. *E. Age.* — Insanity, in the forms which have been described, is rarely observed before the age of puberty. Imbecility and idiotism are always observed in childhood; but the instances, in which any form of true insanity has occurred at any epoch before puberty, are very few. They have, however, been recorded by J. FRANK, Dr. HASLAM, M. FODÉRÉ, M. ESQUIROL, Dr. PRICHARD, and one case occurred in my own practice, and that was caused by fright. Two cases mentioned by M. ESQUIROL proceeded from the same cause. He met with one case of melancholia complicated with marasmus, in a child eleven years of age, remarkable for his large head and mental precocity. Instances, however, more frequently occur of children becoming melancholic, and even delirious, from jealousy and envy, than is generally supposed. They sometimes are thus affected, although often only temporarily, by seeing the attentions of those to whom they are much attached, bestowed upon others; and by being outstripped in obtaining distinctions at school.

267. After fifteen years of age, insanity ceases to be a rare occurrence. About the period of puberty, in females, or when the catamenia are about to be established, melancholia and mania occasionally appear, and especially if the growth be rapid, and the catamenia are retained, suppressed, insufficient, difficult, painful, or irregular. In these cases, and still more so at a later period, hysteria is generally attendant upon the mental disorder. During the first few years after puberty, in the male, mania and melancholia not infrequently occur; the former generally from the excitement of sexual desires, the latter from masturbation or venereal excesses. M. ESQUIROL remarks, that mania, in all its forms of excitement, appears chiefly in early life; melancholia, in middle age; and dementia, in the advanced epochs of existence. In youth, insanity assumes an acute and violent course, and often terminates by a remarkable crisis: in middle age, it is more prone to become chronic, and is oftener complicated with disorder of the abdominal viscera; but is sometimes resolved by hæmorrhage from the hæmorrhoidal vessels, or by diarrhœa. At an advanced age, it is apt to pass into dementia, and to be complicated with paralysis, apoplexy, &c.; and recovery is much less to be expected. However, dementia may occur in the young; and very aged persons may be attacked by mania, and recover from it, — but these are only exceptions from the rule just stated.

268. The *ages* at which insanity most frequently appears, are — that between 30 and 40; next, that from 20 to 30, and from 40 to 60. M. ESQUIROL, however, states, that the maximum number of admissions of cases of insanity take place from 30 to 35 years of age: that each five years, from 20 to 35, give nearly the same number: that the admissions of males are more numerous from 25 to 30; and those of females, from 35 to 40: that the periods from 30 to 35 follow thereafter, for the men; and from 40 to 45, for the women: and that the admission of males from 20 to 25 years of age occupy the third rank of frequency; whilst those of females hold only the sixth rank. From this it follows, that insanity is most frequent at an earlier age in men, than in women. M. ESQUIROL further states, that the wealthy classes are much earlier attacked — or

rather, are affected in greater numbers at an early age — than the laborious. M. GEORGET adduces the following calculation of the ages of insane persons, on admission into several institutions in England and France: —

From 10 to 20 years of age	365
20 to 30	1106
30 to 40	1416
40 to 50	861
50 to 60	461
60 to 70	174
70 and upwards	35
	4409

269. Yet, although a greater number become insane from 30 to 40, than at any other age, still the number may not be really greater, relatively to the proportion of persons in society of farther advanced ages; and hence, 174 instances of the malady occurring in persons aged between 60 and 70, may actually show a greater prevalence of it at that age, than 1416 cases appearing between 30 and 40 years of age. That this, however, is not the case, — and that a greater number, relatively to the proportion of persons existing in the community at that age, actually become insane between 30 and 40 years, — is proved by the number of persons surviving out of each 1000 at successive periods of life. In this country, 410, out of each 1000 born, will reach 30; and 345 will reach 39; but 220 will reach 60, and 140 will attain 70; and if the mean number of those between 30 and 40 thus be 376, and that of those between 60 and 70 be 146, it will be at once manifest, that the number of instances of the invasion of insanity is, relatively to the proportion of persons between 30 and 40 years of age, actually greater at that period.

270. M. ESQUIROL, however, believes that a proportionably increased frequency of mental disorder, with the advance of age, really does obtain, although the predisposition, thus arising from advancing age, increases in an irregular manner. The increased number of insane persons, he adds, compared with the population of that age, is very striking between 50 and 55 years. From 70 to 75, and from this age to 80, it becomes enormous, owing to the frequency of senile dementia. This is very probably correct; but it must not be overlooked, that a very large proportion of the cases of hereditary insanity occurs between 30 and 40, or even earlier; and it is admitted, that these cases constitute the great majority.

271. *F. Education.*—There are few causes which more powerfully predispose to insanity than erroneous education and moral discipline in early age. —*a.* Too great indulgence in childhood, and previously to, as well as during, puberty, and a want of moral discipline then and up to manhood, with neglect of that education, which inculcates, and, indeed, enforces, proper principles of feeling and action, are undoubtedly amongst the most deeply laid foundations of insanity. Persons thus brought up, have their temper, emotions, and moral affections so little under command, — are so subject to ebullitions of passion, to caprices, or violent and fugitive emotions, — are so liable to act from momentary feeling and impulse, — as to acquire a disposition of mind, or moral character, not only most unamiable in itself, but also most prone to marked disorder, when subjected to its more immediately productive causes.

272. *b.* The premature and overstrained exertion of the mental powers is another most important cause of predisposition. In the higher and middle classes of society, the mind is excited much beyond its powers; and the child, being required to perform too much, with its imperfectly developed faculties, experiences, as a consequence of such premature excitement, increased vascular action in the brain and its membranes, at a period of life most disposed to vascular disorder in this organ; and the foundation is thus laid for chronic disorder, and especially for chronic inflammatory action of that part of the nervous system with which the manifestations of mind are most intimately allied. The quantity, as well as the diversity and range, of mental exertion, now required from both sexes at a too early epoch of childhood, and during the period which elapses from mere infancy to puberty, while both mind and body are only in an early stage of formation, must necessarily prove injurious, both mentally and physically, — and especially to those who are either delicately constituted, or tainted by any hereditary disposition to insanity. Therefore, when this disposition exists, not only should premature and overstrained mental exertion be avoided, but also should the feelings, the passions, and the actions be subjected to strict discipline — to a discipline not too harsh or rigid, but rational and consistent. The mind ought to be formed under a kind restraint, and imbued with correct principles, and with a due sense of moral and religious responsibility. In the present day, too much attention is paid to an early cultivation of intellect, and to the mere acquisition of knowledge of facts and phenomena, to the neglect of the education of the moral affections, and of just principles of feeling and of acting. The great ends of education, as now conducted, are, as respects the one sex, the attainment of that knowledge and of that range of information which may enable its possessor most successfully to compete in the general scramble for wealth, for advancement in society, or even for existence; and, as regards the softer sex, the possession of such accomplishments, and the acquisition of so wide and so superficial a range of ideas, in a very limited period of time, as may strike or captivate, or may be more readily and generally made available in society, and thus become the current coin of the mind in conversation. These objects are pursued in education in a manner but too well calculated to overstrain the early intellect, to exhaust the feeble mind, and to derange the hereditarily predisposed. The mind is engorged with food, not of the most wholesome or digestible quality, beyond its powers of healthy digestion and due assimilation, and even before these powers are fully evolved; and hence, but too frequently, follow disorders, varied in extent and intensity, of its most important and effective manifestations or functions.

273. *G. Climate and Seasons.* — *a.* It is very doubtful what degree of predisposition can be ascribed to climate and seasons, especially as most of the differences in the numbers of the insane in different *climates*, may be attributed to various moral and physical circumstances not necessarily dependent upon climate. In warm climates, and even in Turkey, and other Mahommedan coun-

tries beyond the tropics, and in hot climates, where the minds of the population are under the sway of the Romish and Greek churches, insanity is much less frequent, than in temperate and highly civilised countries. M. ESQUIROL, in accounting for the greater prevalence of insanity in temperate climates, attributes too much importance to sudden alterations or vicissitudes of temperature. The greater frequency of the malady in these climates is plainly attributable to other causes than this. I believe, however, that a predisposition to insanity, and particularly to connate and puerile imbecility, and to dementia, is to some extent generated by marshy or miasmatous places, particularly in low districts subject to inundations, and in low valleys placed deep between precipitous mountains. There, the mind and body are checked or weakened in the course of development, and the latter early becomes the subject of diseases which impair its vigour and further weaken the powers of mind.

274. *b.* The *seasons*, according to M. ESQUIROL, have some influence in causing insanity,—but probably more as exciting, than as predisposing, causes. High ranges of temperature seem to have considerable influence in causing or in determining the character or form of the disorder, and particularly mania, or the higher states of the malady. M. ESQUIROL has given a table of the admissions into the *Salpêtrière*, during each month, for nine years, according to which it would appear, that the lowest number was admitted in January; and that the admissions increased progressively from March till July, when they reached the maximum. They then progressively decreased till October. From this month to March they varied somewhat in number, but not so much as to excite speculation.

275. *H. Professions, Employments, &c.*—*a.* The frequency or infrequency of insanity amongst persons pursuing certain professions or employments, is obviously to be referred to the several circumstances more immediately connected with these employments; but most of these circumstances will be more fully considered hereafter. The learned professions certainly furnish fewer cases of insanity, relatively to the numbers exercising them, than any other class of persons in the middle ranks of the community. This, probably, is owing to the education for the professions, in early life, being such as tends more than any other to develop, and to strengthen, the judging and reasoning powers, without exciting the imagination, or prematurely involving the feelings and passions. Some exceptions, however, may be found among young divines, who, from enthusiasm or anxiety respecting the state of their minds, have become partially or altogether insane; but such cases are comparatively rare amongst the soberly and regularly educated.

276. *b.* I believe that insanity is most prevalent among artists, musicians, and actors, relatively to the number of persons pursuing these occupations. This frequency obviously depends upon a great variety of circumstances, many of which will be found amongst the moral causes of this malady. In the present day, — for it was not so formerly, and in the palmy days of Italian art, — few artists receive an education, in early life, calculated to develop, or to strengthen, the intellectual and reasoning powers. The imagination is early and almost exclusively exercised; and many of the instinctive moral affections of mind (see note, § 66.), which exert so powerful an influence upon mental sanity, are so often brought into inordinate action, without the due control of sound judgment and strict principle, that first partial, and ultimately general, insanity is the more liable to appear. Besides, artists, in the wide acceptation of the word, are liable, in the exercise of their art, to sustained excitement, not merely of the imagination, but also of the feelings and passions, — to a certain tension of the mind, — tending to exhaust, and at length to disorder, the intellectual powers. There are few classes, moreover, who entertain more extravagant ideas of their own merits, than those to whom I now refer; and who, consequently, are more liable to jealousy, envy, disappointments, and wounded self-love. Poets and literary men are liable to the same imputations, — entertain the same ideas of themselves, and of others, as those who may be classed under the general denomination of artists; but, in general, their education is sounder, and better calculated to strengthen the reasoning or controlling powers of mind. In all, the sedentary occupations, the insufficient exercise in the open air, and the irregularities of living, or the alternations of abstinence and dissipation, aid the moral causes of the malady, in this class of the community.

277. *c.* It must necessarily follow, that insanity will vary in frequency, in different professions and employments, with the degree in which they respectively call into exercise those moral emotions or causes on the one hand, and the physical circumstances on the other, on which this malady has been found more especially to depend. Next to artists, in the liability to mental disorder, may be ranked, according to the tables of M. ESQUIROL, merchants and traders, and military men. This may be expected, especially if brokers or speculators in the funds or share markets are included under this head: and, indeed, merchants, traders, manufacturers, and speculators or gamblers in all kinds of securities or pseudo-securities, have, in recent times, so entirely fallen within the same category; and are, from the governor or director of the most powerful corporate bodies in the world, down to the very humblest adventurer in a bubble company, so generally and completely subjected, from the nature of their engagements, — from the epidemic scramble after gain at all hazards,— to alternate excitement and depression — to elated expectations and painful anxieties — to hopes and fears — to fortunate anticipations and humiliating disappointments; and have the prospects of being, or are, in fact, one day as rich as Crœsus, and the next even poorer than the meanest slave, — that the mind, which probably has never been strong, nor duly strengthened by wholesome education, and by the early inculcation of sound principles of feeling and acting, at last experiences, and manifests, the shock, in some one of the various forms of insanity. Shall the medical philosopher — contemplating the present state of society, seeing these things, and knowing the circumstantiality with which insane acts and crimes are published, commented upon, and rendered interesting to vulgar tastes and minds — be surprised at the existing prevalence of insanity, and one of its most common results — suicide? The weak, the injudiciously tutored, and the pampered, mind, after a career of ill-deserved prosperity, — a prosperity often as iniquitously enjoyed

as unjustly earned, — not infrequently experiences a reverse, which it is incapable of enduring without more or less of mental disorder; but the reverse is commonly attended by circumstances involving also many confiding and innocent persons; and thus more than one sustains a shock, before which reason is shaken or entirely overthrown.

278. I. *Previous attacks of insanity, or other diseases of the brain*, greatly increase the susceptibility of mental disorder. Although recovery from insanity often takes place without any subsequent manifestation of mental disease, and although even repeated attacks have been sustained, and a complete and permanent restoration has occurred nevertheless, — yet much more frequently madness leaves the person, who has once been its subject, much more prone to a return of it. In many cases, the patient continues, for a long period after recovery has apparently been established, more irritable and excitable than previously to the attack: he is irascible; very susceptible of impressions; and less capable of application to business, or of mental exertion. After every successive attack, this change in temper and character becomes more manifest, until the disease assumes a remittent, and ultimately a continued, form; a state of permanent incoherency or imbecility ultimately supervening.

279. Inflammations of the brain or of its membranes, frequent attacks of epilepsy, apoplectic and paralytic seizures, and fevers with predominant affection of the brain, often predispose to mental disorder. Indeed, these maladies are not infrequently both attended and followed by delirium, or some form or other of insanity, which generally disappears in a few days, or at most weeks, after the primary malady has evinced signs of amendment, or after recovery from it has taken place. When either of these cerebral diseases are thus complicated, the danger of the recurrence of a temporary, or a severe, or even a permanent, attack of insanity, or of a return of the primary disease, attended by a more complete overthrow of the mental powers, is much heightened. This is especially the case in respect of epilepsy, particularly when slight partial paralysis with mental disorder follows the fit. In such cases, incoherency, imbecility, and, ultimately, fatuity, often successively appear. In some instances, where the epileptic paroxysm is attended by violent mania, which subsides in a few days afterwards, the mental derangement gradually becomes permanent, and either supersedes the epilepsy, or continues complicated with it. When insanity is thus caused by epilepsy, sullenness, sudden irascibility, with a disposition to commit the most atrocious acts, and various manifestations of moral disorder, often characterise the malady.

280. ii. THE EXCITING OR PRODUCTIVE CAUSES. — Certain of the causes which have been already considered, may, from their nature or intensity, give rise to insanity, without the aid of any exciting occasion, or, at least, of any so marked as to attract the notice of the patient's friends. On the other hand, many of the causes about to be noticed, either from their slight but often combined action, or from their continued influence, actually predispose to, rather than excite, insanity; or they affect so slowly and imperceptibly the mental powers, as well as the bodily functions, without giving rise to any sudden or manifest shock of the mind, as to change the character or constitution of both, and thereby fit or prepare them for the injurious impression of causes which would otherwise have been entirely innocuous. — The exciting causes have been very commonly divided into *moral* and *physical;* and under these heads have been also comprised, by some of the best writers, the causes already considered, as creating a predisposition to mental disorder. And when the circumstances just alluded to, respecting the operation of these causes, are considered, there can be but little fault found with this arrangement. Some authors have differed as to the comparative influence of *moral* and *physical* causes in occasioning this malady. But the difference has arisen chiefly from the more extended signification assigned to the latter term by some, and from their having comprised under it various important causes kept entirely apart by others, — and especially the greatest of all causes — hereditary predisposition. Leaving this, therefore, out of the arrangement, or, rather, considering it separately, there can be no doubt of the influence of the moral causes, in the production of insanity, being much greater than that of the physical. Still the matter is not so satisfactorily solved, especially by referring to statistical tables, as may be imagined. For, although it may have appeared, from the information received, that the malady was produced by some moral cause; yet there may have existed at the time, or closely upon it, some physical disorder, and especially some functional disturbance of the digestive, assimilative, and excreting organs, or a morbid susceptibility of the nervous system, or both, without the existence of which the moral affection may have been quite inoperative. Agreeing, however, with HEINROTH, PINEL, GEORGET, GUISLAIN, PRICHARD, and others, as to the great and predominant influence of moral over physical causes in the production of insanity; still, even in the cases where they seem to have been most influential, various physical or functional states or disorders may have existed, so as to predispose the nervous system to be affected by them; or the moral emotion may have first occasioned some severe physical diseases, of which the mental disorder was the more immediate effect.

281. In proof of the predominance of moral over physical causes, most writers refer to the great frequency of insanity among highly civilised people, and its almost entire absence from savage or barbarous nations. The data, however, are not to be depended upon, as respects savage communities. It is not correct to say, as many have, that insanity is unknown among them. It certainly is comparatively rare, or very seldom occurs, — but it does occur amongst the greatest of all savages; various circumstances, however, preventing persons in this state from being long troublesome to their friends or to the community, — or, in other words, once an individual "loses his head," — as the being insane is very generally termed, — he is soon got rid of; and his insane acts, before his state is recognised, often directly or indirectly terminate his existence. On this subject Dr. PRICHARD remarks, that, "in a barbarous state of society, the passions are under no restraint — the emotions are impetuous; hatred and malignity are in perpetual exercise; the fierce and sensual desires which are common to mankind and the inferior tribes, are indulged without limit. Nor

are the intellectual faculties without their exercise in carrying on the stratagems of barbarous warfare. We should conjecture that such a state of society, in which the passions are in perpetual and violent agitation, would not infrequently produce insanity." Still, I contend that these are not the chief moral causes of which this malady is so frequently a result; and that many of the physical disorders, which either predispose to, or produce, mental disorder, and which remarkably aid the operation of moral causes, are not very common in savage communities. If we contrast the emotions which powerfully affect the human mind in civilised society, with those which have been just noticed, the consequences resulting from the former to the mind itself, may be, in some measure, anticipated. When we consider the premature and excessive exertion of the faculties in highly civilised countries; the restraints imposed by social institutions and legislation, and the consequences which often arise out of them; the diversity of interests and of feelings brought into action by many pursuits, upon which wealth, honour, and even existence, depend; the long-continued anxieties, griefs, disappointed hopes, the family dissensions, and injured or lost affections; the chords of feeling too intensely strung; the prolonged or intense mental exertion; the continued tension of the imagination, or of the intellectual powers; the pride, ambition, and humiliations; the distractions of the mind by religion, by worldly speculations, and diversified engagements; the sudden reverses, the jealousies, and the numerous causes continually impressing the moral sentiments and affections, and increasing the susceptibility of the nervous system, as well as disordering the general health, — when we contemplate the prevalence, the frequent recurrences, and often the almost constant operation, of all these circumstances in civilised life, we cannot be surprised at the effects produced by them upon the mind and nervous system; especially when we find that they seldom act singly, but generally in combinations, or associated with various predisposing and exciting or determining causes.

282. There are, also, other considerations, not to be overlooked in attempting to account for the greater prevalence of insanity in civilised than in savage communities. Children of weak physical powers are seldom reared among the latter; and the higher intellectual faculties, and the finer and more elevated moral affections, — especially the powers of intellection, and the rational emotions of mind (see note, § 66.), — are imperfectly developed in them, and consequently less prone to experience or to originate mental disorder. In barbarous societies, the mind retains much of the constitution and character presented by it in childhood and boyhood in more civilised communities: it is incapable of comprehensive views and combinations of thought, or of prolonged exertion; it retains the sanguine disposition of youth, and is little susceptible of care and anxiety, and thinks of little, but of present gratification and ease. On the other hand, whilst civilisation develops all the finer emotions and affections, all the higher and more reflective faculties, and augments the susceptibility of the moral feelings, as well as the general sensibility, it tends also to disorder them the more, owing to numerous resulting circumstances, which inordinately excite or seriously disturb them, and which thereby often ultimately overthrow them altogether.

283. M. Georget, however, most probably over-rates the influence of moral causes in the production of insanity. He believes that 95 out of 100 lunatics have become so from the operation of the affections and moral emotions; and he states this to have been the opinion also of M. Pinel. It is in the age, he adds, in which the mind is most susceptible of strong feelings, and in which the passions are excited by the strongest interests, that madness is principally displayed. It is chiefly, however, in the higher and middle classes of society that the moral causes are most productive of insanity. This is shown by the researches of Esquirol, Georget, Guislain, and others. It is in them that the influence of civilisation, in increasing the frequency of the malady, is especially manifested; thus proving the justness of the remarks which I have ventured above, and which are partly founded upon my observation of the state of society in savage communities. Amongst the lower orders, physical causes have more influence than in the higher; and, of the moral causes, an unrestrained sway of the temper and passions is the most manifest. Physical causes are, according to the writers just mentioned, more influential in females than males; and, in the former, amongst the lowest classes, I would add, that violence of temper is the most productive moral cause of the malady. — In further considering the *exciting causes*, I shall offer a few observations — 1st, on the more remarkable emotions of the mind, of which insanity is often a consequence; 2dly, on the physical causes of the malady; and, 3dly, on certain circumstances in the general habits and manners, and in the social and political states, of our species, resulting from various combinations of moral and physical causes, which both indirectly and immediately occasion mental disease.

284. *A.* Of certain Moral Emotions. — *a. The more violent passions and emotions*, sometimes, by their sudden or vehement action, more or less disorder the functions of the brain, — especially violent anger, and terror. Unrestrained bursts of temper are very frequent causes in the lowest classes of the community, and particularly in females — in whom it acts either directly on the brain, or consecutively, by first disordering the uterine functions, or in both modes. M. Esquirol, however, assigns a greater influence to fright than to anger; but mania is the form of the disorder which most frequently results from both these causes. Dementia much more rarely is occasioned by them. These emotions are the most intense and the most sudden, of which the human mind is susceptible; and, fortunately, they are amongst the shortest in their duration. The nervous system, and particularly the functions of the brain, are more violently agitated by them than by any other; and in many instances, where no predisposition to insanity exists, fits of convulsion, tremors, and various nervous affections, are caused by them, — especially in weak, nervous, and susceptible constitutions.

285. *b. Care, anxiety, grief, distress, and all the depressing emotions*, are the chief causes of mental disease. In the same category may be included, domestic griefs, and disagreements, family dissensions, ill-assorted marriages, reverses of fortune, disappointments, prolonged fears, men-

tal humiliations, jealousy, wounded self-love. The tables which I shall give hereafter, will show the relative influence of these and other causes in one civilised country. It will readily be admitted, that it is chiefly in communities far advanced in civilisation, that these causes are most productive of this malady. These causes act very generally in combination, either with one another, or with various predisposing and physical circumstances: many of them operate upon the mind slowly and silently, and only by first disordering one or more of the bodily functions. Joy, and the more exciting emotions, less frequently occasion insanity than is commonly supposed. Esquirol states, that the opinion of Mead, as to the frequency of mental disorder from this cause, is not well founded; but he admits the importance attached by Pinel to the struggle between religious and moral principles, and the passions and worldly interests, — a struggle sometimes long sustained, and terminating in impairment of reason, and especially in melancholia. It is not only in their individual, but also in their combined, operation, that the causes of insanity should be studied: and in order that sound principles subservient to rational hygienic and prophylactic measures may be deduced from the study, the various combinations and successions of action should be recognised; and the intermediate changes, mental and physical, ought to be traced as far as the means of investigation may be furnished us. It is chiefly, also, by ascertaining the changes first induced in the functions of important organs, and the succession of morbid actions resulting therefrom, that we can be enabled to form rational or successful indications of cure.

286. *c. Religious impressions, and apprehensions of a future state*, are amongst the most important mental causes of insanity. — *Religious madness*, as it has been termed, has long been an interesting subject to the philosophic physician; and its frequency in Great Britain demands from him a particular notice of the various circumstances connected with it. — I cannot agree with Dr. Prichard, in considering that the number of persons, who become insane from religious hopes and fears, is much less considerable than it is generally supposed to be. The frequency of disorder from this cause varies remarkably in different places and in different times; and the mischief often becomes either endemic or epidemic, from every fanatic, or ambitious preacher, who is desirous of acquiring notoriety, or of being the originator, or the leader, of a particular sect, — from any one, however slightly imbued with religious knowledge, or however ignorant, who wishes to be distinguished amongst those who are equally ignorant, but more honest, with himself, — and from any one, who, already partially insane, believes himself inspired, and called by the Almighty to instruct and convert men, before he is himself even partially instructed, — being permitted to "deal damnation round the land," and to excite the feelings and the fears, or to distinguish the hopes, of the ignorant, the nervous, the susceptible, and of the hysterical, without any control as to education, doctrines, or religious principles. As the numbers of these adventurers increase or diminish, so do the victims of this encouragement to disturb the minds of the community also vary in number. In this vicious plenitude of liberty, every body enjoys not only entire freedom of thinking and speaking, but also of acting. The rogue who is too lazy to work, is allowed, without inquiry into his knowledge, or belief, and without hindrance on account of character or of the mischievous nature of his doctrines, to harass the feelings, to excite the imagination, and to blight the happiness, of many of those who listen to him. It is not seen, or, if seen, in no way guarded against, that the more dangerous the doctrine, the greater the fanaticism, or the more vehement and impassioned the declamation with which it is promulgated, the more intensely are the uneducated affected, and the mind disordered by it. The more absurd and inflated the harangue, the more frantic the manner, and the greater the outrage on common sense and decency, the moral infection sinks the more deeply, and spreads the more widely, until mental disorder assumes a truly epidemic form. That this is not over-stated, is sufficiently proved by what has taken place recently in this metropolis, by the camp-meetings in America, and by the "revivals" in Scotland and in that country.

287. The frequency of mental disorder from this cause has been insisted upon by Darwin, Perfect, Falret, Jacobi, and others, but somewhat doubted by Dr. Prichard. According to my own observation, I believe this to be a frequent cause of insanity in this country, particularly amongst protestant dissenters, — but of very irregular frequency, owing to the circumstances just alluded to. The forms of disorder caused by it are chiefly theomania, melancholia, suicidal insanity, mania, and mania complicated with hysteria. It must not, however, be supposed that religious feelings are generally the only and sole cause of mental disorder, amongst persons whose minds are much engaged with these sentiments; or that all the cases of insanity, in which the mind is occupied with religious ideas, have proceeded either solely or chiefly from this source. In the great majority, perhaps, of instances, other moral causes, or even bodily disorders, have either predisposed the mind to be influenced by these feelings, or have been associated with them in their operation on the mind. Dr. Jacobi observes, that the original cause of derangement is often some misfortune, or some physical influence, — religious ideas rather determining the morbid effect upon the mind, than actually originating it. There is much truth in this, and it is most important in respect of treatment. I have witnessed several cases illustrative of the justness of this view; and, by acting upon it, they have had a favourable issue.

288. The more civilised the human mind, the more desirous it becomes to form anticipations of the future, or to entertain hopes and fears of good and evil, which are not limited to the present state of existence. In forming these anticipations, the knowledge of our own imperfections, and of our numerous acts of demerit, naturally impart to them a certain degree of gloom or despondency; and accordingly we find, in all civilised ages and countries, that these feelings, when inordinately indulged, — especially during states of physical disorder, or when the mind is already depressed by grief, anxiety, and bereavements, — have caused mental disease. Dr. Heinroth has collected numerous instances from the early fables of Greece,

showing, that madness from this cause was not of rare occurrence in the ages of remote antiquity. The circumstances in the moral nature of mankind, on which religious insanity depends, cannot very materially change, and may therefore be expected always to produce their usual effects; still they may be more remarkably predominant, or very much less so, in certain periods and places, than in others; and that they have been, and still are, thus variable, is well known. Dr. PRICHARD observes, that, in France since the revolution, the influence of religion on the community has been less than it ever was in any civilised country; and French physicians have informed him, that cases of religious insanity have become proportionately rare. M. ESQUIROL states, that the changes during the last fifty years, "in the moral sentiments and habits of the people, have produced more instances of madness in France, than all their political calamities. The change in ancient customs and fixed habits, in old and established sentiments and opinions for speculative theories and dangerous innovations, has contributed to this. Religion now comes forward only as a formal usage on solemn occasions, and no longer affords her consolation to the afflicted, or hope to the desponding. Morality based on religion is no longer the guide of reason in the narrow and difficult path of life. A cold egotism has dried up all the sources of sentiment: there no longer exist domestic affections, respect, attachment, authority, or reciprocal dependences. Every one lives for himself; none is anxious to form those wise and salutary provisions which ought to connect the present age with those which are destined to follow it."

289. An enthusiastic, or a vehement and impassioned, mode of preaching, and declamations abounding with frightful pictures and condemnation, are not confined to any sect; and, in some countries, are as common amongst Romanists as among Protestants and protestant dissenters.—The itinerant missionaries of all sects—of Romanists as well as of Protestants—are remarkable for fanaticism; and for modes of preaching, more calculated to disorder the minds of persons, who are already suffering the ills of life, the depressing passions, bereavements of affection or of fortune, exhaustion of nervous power, and bodily disease, than to afford the consolations which religion is intended to administer in these and other circumstances of distress.

290. The question, which has been often agitated, as to the greater prevalence of insanity among Romanists and Protestants, may seem to bear upon this topic, but not so closely as it may at first appear; for, although mental disorders may be more frequent in the latter, than in the former, it by no means follows that religious feelings are the causes of this frequency, or that the numbers of the insane are greatly increased by cases of this kind. The number among Romanists may be as great as that in Protestants,—other circumstances compensating for the less influence of this cause in the former, than in the latter persuasion. That religious insanity, however, is much less common in Romanists than in Protestants, and especially protestant dissenters, cannot be doubted by any one whose sphere of observation has enabled him to form any opinion on the matter. Dr. HALLARAN (*Pract. Observ. on Insanity.* Cork, 1818, p. 32.) states, that in the Lunatic Asylum at Cork, in which the admissions of Romanists are about ten to one of Protestants, no instance has occurred, within his recollection, of mental derangement in the former from religious enthusiasm; but that several dissenters from the established church have been so affected. The reason of this difference is obvious. The ministers of the Romish church will not allow the minds of their flocks to distrust points of doctrine and discipline,—or to fall into these doubts, which distract the minds of those who are either wavering in their opinions or entertain entire liberty of conscience.

291. Whilst HALLARAN, GUISLAIN, LEUPOLDT, BURROWS, and others, contend for the greater prevalence of mental diseases in Protestants than in Romanists, JACOBI and CHIARUGGI believe that cases of religious insanity are also frequent in the latter. Dr. JACOBI remarks, that the character of religious madness in members of these two communities, and the manner of its accession, are for the most part different. In the lunatic asylums of Roman Catholic Germany, many of the inmates of the lower classes have become religiously mad, from the delusions of a wild and unregulated imagination, excited by superstitious phantasms, through neglect of the culture of the understanding, and the overpowering influence of sensual passions. Dr. PRICHARD has given a table from JACOBI, of the comparative prevalence of insanity in the Romanists and Protestants of the Prussian States on the Rhine; and it appears from it, that the proportion of lunatics in the former, compared with that in the latter, is as 11 to 10; and that the proportion is much higher among the Jews than in these persuasions. Still, this conveys no information as to the comparative prevalence of religious insanity among them.

292. Mr. TUKE's account of the Retreat, the asylum belonging to the Quakers or Friends, furnishes only 3 cases, out of 149, which could at all be ascribed to anxieties connected with religion; and in his list of causes of insanity amongst the inmates of this asylum, pride, ambition, jealousy, rage, debauchery, penury, or care produced by hardships, &c.—causes so productive of insanity in other institutions,—are not even mentioned. The exemption from these prevalent causes of mental disorder are attributable to the strictness of moral education and discipline, to the restraints imposed on the imagination and the indulgence of the passions, and to the absence of enthusiastic excitement on religious topics, in this sect. Still, insanity is as prevalent among Quakers, as among any other sect, relatively to their numbers,—owing, as above remarked (§ 253.), to the increased influence, in them, of hereditary predisposition.

293. From what has been now stated, it will appear that the frequency of religious insanity in different persuasions and sects will depend upon the excess of fervour characterising them. Exuberance of zeal on any subject soon passes on to madness in some constitutions; and on religion, unless tempered by a sound judgment, it is apt to degenerate into fanaticism, and thence into delirium which often becomes permanent. Excessive fervour, or enthusiasm, generally shows itself in religion, when any revolution of opinion or doctrine takes place; and when new lights and new sects arise amongst those who have

received a certain amount of education and religious instruction. Dr. Robertson (*Hist. of Charles V.* vol. ii.) has well remarked, that "when the human mind is roused by grand objects, and agitated by strong passions, its operations are apt to become irregular and extravagant. Upon any great revolution in religion, such irregularities abound most at that particular period, when men, having thrown off the authority of their ancient principles, do not yet fully comprehend the nature, or feel the obligation, of those new tenets which they have embraced. The mind in that situation, pushed forward with the boldness which prompted it to reject established opinions, and not guided by a clear knowledge of the system substituted in their place, disdains all restraint, and runs into wild notions, which often lead to scandalous and immoral conduct. Such was the effect in the first ages of Christianity, as well as at the era of the Reformation. The renunciation of the ancient faith, and ignorance of that which they had embraced in lieu of it, excited converts to acts more resembling insanity, than of that religion which inculcates the purest morality and government of our passions." — Dr. Burrows states, that he does not recollect an instance of insanity from religion, in any person steadfast to his ancient opinions. Wherever the disorder was suspected to proceed from this cause, it was clearly traced to the adoption of new tenets, which had not been comprehended, and found to originate during the conflict in deciding between opposite doctrines.

294. It must not be supposed, from what I have advanced, that the Christian religion is truly chargeable with causing insanity; it actually has an opposite tendency. Mistaken views, excessive fervour, unfounded fears, and various feelings arising from these sources, are the only causes of insanity in connection with religion. Amongst those who entertain just and sober opinions on religious topics, — who make Christian doctrines the basis of their morals, the governors of their passions, the soothers of their cares, and their hopes of futurity, — insanity rarely occurs. The moral causes of derangement, which would not fail of producing injurious effects on others, prove innocuous in them, for these causes would be met by controlling and calming considerations and sentiments, such as would deprive them of intensity or neutralise their effects. Truly religious sentiments and obligations soothe the more turbulent emotions, furnish consolations in afflictions, heal the wounded feelings, administer hopes to the desponding, and arrest the hands of violence and of despair.

295. In considering how far insanity may have arisen from mistaken views, or ill-regulated zeal, in religion, the influence of sounder Christian doctrines in preventing its occurrence from other moral causes ought not to be overlooked; but this beneficial influence is too often unheeded, from being seldom brought to the notice of the physician, or from being altogether concealed in the breasts of those who have experienced it, whilst the origin of mental disease in disordered religious feelings is obtruded upon his attention. If the data could be procured, I believe, that it would be certainly found that the very great majority of those who have committed suicide in states of mind which at least very nearly approach, if they do not altogether amount to, insanity, actually either have been of no religion at all, or have entertained a very imperfect and inadequate sense of it; and that religious obligations have often suppressed suggestions of suicide, which would certainly have been committed if these had not been entertained. And further, I believe, that a very large proportion of those who become insane, especially amongst the lowest and most ignorant classes, have fallen into this state from the scope given to their temper and passions, and from other mental causes, deprived of that salutary control, and of those consolations, furnished by the beneficent doctrines of Christianity. The tendency of Cowper to mental derangement was long opposed by the influence of true religious principles; and, in later life, a sense of his duties and obligations arrested his hand in the act of suicide.

296. *B.* Physical Causes of Insanity. — The *physical causes* of insanity may be divided into — 1st, Those which affect the encephalon chiefly and immediately; 2dly, Those which exhaust organic nervous power, and disorder the general organic sensibility; 3dly, Those which act upon remote organs or parts, with which the brain is disposed to sympathise. — Under the head of physical causes, M. Esquirol has arranged *hereditary predisposition*. In treating of the causes of insanity, this should be viewed apart from the exciting physical causes; for, although it often appears to occasion insanity, without any other circumstance being recognised to develop the predisposition, and although it is strictly physical, it still requires, from its nature and influence, an early and separate consideration (§ 251.).

297. *a.* Of *the causes which more directly affect the encephalon*, — *α. Insolation, sun-stroke*, and exposure of the head to great heat, as to the fires of forges, &c., deserve a passing notice. M. Esquirol has observed considerable influence from the last of these; and I have known several instances of exposure to the heat of the sun in warm climates, and in hot days in temperate countries, having developed an attack of mania. Cases of this kind partake much of the character of phrenitis, and are actually such in most cases, especially at their commencement; whilst, in others, more or less of congestion takes place, or follows a state of inflammatory action. It is chiefly where a marked predisposition has existed, or moral causes have cooperated with this, that mental disorder is developed, or persists for a considerable period. In some instances, exposure to the sun's rays first produces an epileptic seizure; the derangement of mind either immediately following it, or appearing after several recurrences. These cases more obviously proceed, at first, from the congestion, or vascular turgescence, of the brain or of its membranes, caused by the solar rays. Exposure to the heat of *charcoal fires* has also been observed to cause insanity; the fumes of these fires probably contributing to these injurious effects. The liability of cooks to mental disorder, which has been remarked on the Continent especially, is probably attributable to this cause.

298. *β. Frequent or habitual determinations of blood to the head*, and *congestions of the brain and its membranes*, are amongst the most common physical causes of insanity, especially when an hereditary disposition to it exists; but, frequently, some fully developed or specific organic malady

of the brain appears before the effect upon the mind is manifested, — especially *apoplexy* and *paralysis*. In these latter cases, softening of a portion of the brain, or hæmorrhage in some part of it, or both lesions, with various attendant changes, are the more immediate effects, and upon these the mental disorder is only contingent in some instances. When mental disease follows apoplexy, some form or other of paralysis is often associated with it. The varieties of mental disorder consequent upon *apoplexy*, or upon *paralysis*, or upon both, are chiefly the several grades of dementia, and forms of partial insanity; but any other variety may also proceed from them. (See art. Apoplexy, § 52. *et passim.*)

299. γ. *Epileptic* and *convulsive affections* are, perhaps, more frequently productive of insanity, and especially of the several grades of dementia (§ 155, 156.), than any other disease, unless, perhaps, *apoplexy* and *paralysis*. M. Esquirol states, that of 300 epileptics in the Salpêtrière more than one half are insane. It may be supposed that the influence of epilepsy in causing insanity depends chiefly upon congestion of blood on the brain, or vascular determination to it; but this inference may be only partially correct; for, even admitting that these lesions of the cerebral circulation are present in many epileptic cases, it does not follow that they exist in all of them. I believe that it will be found, that when epilepsy is connected with, or depends upon, a deficiency of blood, and great impairment of nervous power (see art. Epilepsy, § 27.), that it is more apt to be followed by insanity than when attended by either congestion, or determination of blood to the brain. M. Esquirol remarks that, although epilepsy and convulsions are often causes of insanity, especially of furious mania and dementia, that *vertigo* still more frequently precedes, and is more destructive to the mental powers than they. I believe that vertigo more frequently proceeds from an impaired circulation in the brain, conjoined probably with weakened organic nervous energy of this organ, than from opposite states of the circulating and nervous system. — *Cataleptic* and *ecstatic* affections, and *somnambulism*, may also lapse into mental derangement; or, in other terms, the states of nervous influence and of cerebral circulation, causing these affections, may be only early stages or grades of the same physical disorder of which insanity is the consequence.

300. δ. *The transference or metastasis of disease to the encephalon*, is a not infrequent cause of insanity, especially where a predisposition to it exists. The sudden disappearance, or the suppression, of cutaneous eruptions, of accustomed discharges and evacuations, and of certain painful or constitutional maladies, has often been followed by mental disease. Cases illustrative of the production of inflammatory and other diseases of the brain, and of the various forms of insanity, from these causes, abound in all practical medical works. The suppression of herpes, of scabies, and of other chronic cutaneous eruptions, — of various discharges, as leucorrhœa, chronic diarrhœa, &c., — of hæmorrhagic evacuations, as epistaxis, hæmorrhoids, menorrhagia, — and of gout and rheumatism, — has frequently been followed by insanity, and especially by mania, and melancholia, either in their simple forms, or complicated with paralysis or epilepsy. Where the mental disorder thus supervenes, distinct evidence of acute or subacute inflammation of the brain or of its membranes, or of both, is often evinced for some time before the mind becomes disordered.

301. ε. *Inflammatory and other diseases of the brain* are frequently followed by mental derangement. The delirium symptomatic of these maladies, and of fever with predominant affection of the brain, may subside into one or other of the forms of partial or general insanity; and the various organic lesions occurring in the encephalon and its membranes may be attended, at an early stage, with more or less mental disorder; or, after having given rise to epilepsy, paralysis, or apoplexy, may be followed by such disorder. In such cases, however, the mental affection is to be viewed rather as a contingency, than as a necessary consequence of the organic disease.

302. ζ. *Injuries of the head* are sometimes productive of insanity; owing chiefly to chronic or slow inflammatory action, and its consequences in the brain or membranes. In some cases, acute disease, attended by delirium, is the first effect; but, consequent upon this, any grade of chronic insanity may appear. Occasionally, even, the mental affection does not occur until years have elapsed from the receipt of the injury; and it then may present every grade of severity, and may even be associated with epilepsy or paralysis. During the long interval that may thus elapse, various symptoms, referrible to the encephalon, are generally complained of, and are sometimes so manifest to the physician, as to lead him to dread the impending calamity, and to employ means, which as often fail as succeed in averting it. Dr. Prichard remarks, that there are instances in which a slight peculiarity of character, not amounting to insanity, has remained long, and perhaps through the life of the individual, who has sustained a severe injury of the head. Sometimes this amounts to a kind of moral insanity; the temper being more irritable, and the feelings less under restraint, than formerly. In other instances, there have been greater energy and activity, more of excitement in the general character, which have been thought a change for the better, rather than a morbid alteration. Of this, two remarkable cases have come under my own observation. Van Swieten, Haller, and others have adduced instances of congenital and puerile imbecility having been removed by injuries on the head; and Dr. Prichard mentions a family, consisting of three boys, all idiots, one of whom, having received a severe injury on the head, had his faculties restored, and became a professional man of good talents.

303. *b. Whatever greatly exhausts organic nervous power*, both predisposes to, and directly occasions, insanity. — *a.* Many, however, of those causes, which thus affect nervous energy, favour congestion on the brain, and occasion disease of other vital organs, tending to disorder the functions of the brain sympathetically. Of these, the most influential are masturbation and libertinism, or sexual excesses, sensuality in all its forms, and inordinate indulgence in the use of intoxicating substances and stimulants. The baneful influence of the *first* of these causes is very much greater, in both sexes, than is usually supposed; and is, I believe, a growing evil, with the diffusion of luxury, of precocious knowledge, and of the vices

of civilisation. It is even more prevalent in the female, than in the male sex; and in the former it usually occasions various disorders connected with the sexual organs,—as leucorrhœa, displacement of the uterus; difficult, or disordered, or suppressed, or profuse menstruation; both regular and irregular hysteria, catalepsy, extasis, vertigo, various states of disordered sensibility, &c., — before it gives rise to mental disorder. In both sexes, epilepsy often precedes insanity from this cause; and either it or general paralysis often complicates the advanced progress of the mental disorder, when thus occasioned. Melancholia, the several grades of dementia, especially imbecility and monomania, are the more frequent forms of derangement proceeding from a vice, which not only prostrates the physical powers, but also impairs the intellects, debases the moral affections, and altogether degrades the individual in the scale of social existence, even when manifest insanity does not arise from it. Sexual excesses, and libertinism in persons predisposed, hereditarily or otherwise, have a similar effect to the former cause, although neither so frequently nor so certainly; the mental disorder generally assuming the same forms and morbid associations as have just been mentioned.

304. *β. Intoxicating substances and stimulants* are causes of mental disorders in most countries; but they are among the most influential of all the exciting causes in the lower classes, particularly in the United States of America, in Great Britain and Ireland, and in Germany. In France, Italy, and Spain, this vice is much less frequent. Spirituous liquors are the most generally indulged in; and are the most injurious in their effects, not only on the nervous system, but also upon the digestive and excreting organs. A large proportion of the admissions into pauper lunatic asylums arise from this cause, especially in large cities and manufacturing towns and districts. Mania, monomania, and melancholia most frequently proceed from the abuse of intoxicating liquors; and the cases which are thus caused, are amongst those which are oftenest cured — at least, for a time. The removal of the cause, and the use of sedative means, generally cure the attack: but relapses or recurrences are more frequent in these, than in any other class of cases.

305. The excessive use of opium is as injurious to the nervous energies, and to the mental powers, as addiction to spirituous liquors; but the ill effects resulting from it on the mind, are not often observed in this country. — I have known several instances, all of them females, of the acetate of morphia having been used, instead of opium, as a restorative and intoxicating agent. It was ultimately more or less injurious in all; and in one, partial insanity, with suggestions of suicide, appeared, — but probably other causes contributed to the morbid effect.

306. *γ.* The abuses of *mercurials*, and particularly of *calomel* as a common or frequent purgative, has, in several instances in which I have been consulted, been productive, first of depression of the nervous power, and of a morbidly increased state of the general sensibility, and subsequently of melancholia and other forms of monomania. A surgeon, a pupil of the late Dr. Currie, was in the habit of taking large doses of calomel, at least twice, but more frequently oftener, in the week. He believed himself subject to disease of the liver, resorted to this medicine when he found his spirits greatly depressed, and considered that he was better the day after taking it. He persisted in the frequent use of calomel, and became more and more nervous and hypochondriacal. He was afterwards melancholic, entertained mistaken views of religion, and attempted suicide, which he accomplished in a subsequent attempt. — The daughter of a clergyman in this city was attended by this surgeon, and had very frequently taken large doses of calomel. Her health and spirits had become remarkably impaired, and her intellects disordered. There was no hereditary predisposition to insanity in either side of the family. She had been fond of company and amusements; but was melancholic, physically out of health, tormented by the most distressing religious fears, and refused being seen by her relatives and former friends, when I was directed to visit her. Her despondency, mental misery, and religious delusions were remarkable; and she had frequently contemplated suicide, in order to terminate her suffering. She completely recovered under a restorative treatment, aided by change of scene and of air, and by suitable moral management.

307. *δ. The too frequent or excessive use of colchicum*, for the removal, suppression, or prevention of gout, has given rise to insanity in three instances in which I was consulted. In one of these, melancholia was the more immediate disorder of the mind; in the others, incoherence and imbecility, with illusions, were the consequences. — All powerful *depressants*, and even *cold*, either excessive in grade, or prolonged in its operation, may occasion insanity, by their operation on the nervous power.

308. *ε. Excessive or prolonged lactation*, relatively to the patient's strength, profuse evacuations, particularly leucorrhœa, frequent menorrhagia, profuse hæmorrhoidal discharges, &c., have also induced melancholia, and other partial forms of insanity, and even imbecility, or more complete dementia, chiefly by exhausting the vital powers, especially of the nervous system. It will afterwards be shown, that *puerperal insanity* is occasioned partly by this cause, or rather by the evacuations consequent upon parturition, in connection with previous suffering, and increased susceptibility of the nervous system. Something also may be imputed to the altered state of the general circulation, and of the condition of the uterine organs.

309. *c. Diseases of Organs with which the Brain more or less sympathises*, not infrequently cause insanity, when a predisposition to it already exists. So intimately associated in function are all the organs of the body, through the numerous bonds of union furnished by the organic nervous and vascular systems, that serious disease seldom exists in either, without the functions of one or more of the others being remarkably disturbed: and when visceral disease occurs in a person who has an hereditary or an acquired predisposition to mental disorder, the former is often the cause of the development of the latter; various other circumstances, however, moral and physical, often co-operating with this cause, in the production of the morbid effect upon the mind. — Of this class of physical causes, habitual constipation, inflammatory irritation of the gastro-intestinal mucous surface, diseases of the heart and lungs, functional

disorders and organic lesions of the uterus, and diseases of the biliary and urinary organs, are the most important. It is chiefly when these visceral maladies appear in an obscure and insidious manner, and proceed slowly, that the functions of the brain become disordered in a chronic form.

310. *α.* Without attributing nearly so much influence, as M. Broussais has done, to inflammatory irritation of the *gastro-intestinal mucous surface*, it cannot be denied that its pre-existence is of considerable importance in the production of the mental disorder. But it is very seldom the sole physical cause in these cases; most commonly, exhaustion or depression of the organic nervous influence co-operating with it in producing the effect upon the mind. The disorder of the digestive organs is generally caused, by the excessive use of stimulating and indigestible food, among the opulent; and by constipation, intemperance, unwholesome food, and by cold and want, among the lower classes. In these cases, hypochondriasis, or hypochondriacal melancholia, first appear; and various forms of general insanity supervene.

311. *β.* Severe functional and organic disease of the *heart* or *lungs* may excite insanity in the predisposed, owing to disorder of the circulation in the brain, consequent upon interruptions of it in these organs. — When mental derangement follows diseases of the *biliary* or of the *urinary organs*, it may proceed more immediately from the influence on the brain of the excrementitial matters accumulated in the blood, in consequence of the impaired or disordered function of these organs.

312. *γ.* Of the operation of the functional and organic affections of the *uterine organs*, but little need be here added to what has already been observed. In these cases, the sympathetic effect takes place, most probably, by the propagation, to the spinal cord and brain, of irritation originating in the sexual apparatus; and the mental disorder is generally preceded and attended by one or more of the numerous forms of hysteria, or by epilepsy, and sometimes also by hypochondriasis, or great lowness of spirits. This is especially the case when the catamenia are difficult or suppressed. In many cases, not only uterine disorder, but also gastro-intestinal irritation, is accessory to the causation of the mental disease.

313. In considering the operation of all these physical causes, it should not be overlooked, that it is often extremely difficult to determine, whether the disorder originates in the brain — the other organs sympathising with it, — or whether the disturbance of the mental powers is altogether owing to disease of viscera remote from the encephalon. But, however difficult it may be, an attentive examination of the history and existing symptoms of the case should be instituted, to the determining of this point; as much of the success of treatment will depend upon correct views regarding it.

314. *δ.* When organic nervous or vital power is much depressed, especially in respect of the digestive and excretive functions, *accumulations of morbid secretions, and collections of fæcal matters*, are liable to form in the intestinal canal, and particularly in the *cæcum* and *colon*. These dilate, displace, irritate, and obstruct the bowels; occasioning flatulent distension, spasm of the muscular coats, and various disorders of the whole tube, as well as of the collatitious viscera. These morbid accumulations are apt to occur even in persons who suppose their bowels perfectly open and regular; and they more certainly take place in those who are habitually costive or constipated. The effects, however, of collections of morbid secretions in the bowels, — particularly in the large bowels, — are not limited to these, or even to the adjoining viscera; although, if even thus limited, they would often be sufficient to excite, by the intimate sympathy existing between the digestive organs and the brain, functional disorder of the latter, especially in persons already disposed to such disorder. But there is every reason to believe, that when morbid or fæcal matters accumulate in the intestines, either with or without constipation, the chyle thereby becomes more or less impure or contaminated, and that a portion of these matters is absorbed into the circulation, the blood being consequently altered, and a state of general cachexia being thus produced. Where the predisposition to insanity already exists, the morbid materials conveyed into the blood will be often sufficient to derange the functions of the brain; and, not infrequently, this consecutive derangement will not be limited to these functions, but will extend to several others.

315. The sympathetic influence of the digestive organs on the brain, in connection with the deterioration of the chyle, and the absorption of excrementitious matters from the bowels into the blood, will in this manner occasion hypochondriasis, melancholia, partial and general insanity, and, ultimately, even some of the complications which these occasionally present. The displacements and dilatations of the colon so often observed in melancholia, and sometimes also in other disorders of mind, most probably result from frequent or habitual constipation, even previously to the appearance of mental derangement. And the inflammatory irritation of the gastro-intestinal surface, already noticed (§ 310.) as causing and attending many cases of insanity, is probably the more immediate effect of the impaired energy of the digestive canal, and of the accumulation in it of morbid matters; the consequences as respects the chyle and the blood, just contended for, increasing the effects upon the functions of the brain. The influence of constipation, or even of habitual costiveness, in causing insanity, and the good effects of powerful purgatives in the treatment of it, were well known to the ancients, and to most of the older writers; and, though fully recognised in this country, have been imperfectly estimated on the Continent in recent times, and even erroneously viewed by many, and particularly by Broussais and his disciples.

316. *ε.* Besides the above physical causes, *pregnancy*, the *accumulation* of morbid matters in the intestinal canal, and *of bile* in the biliary apparatus, the presence of *worms in the bowels*, *hypochondriasis*, and *hysteria*, frequently give rise to insanity. The abuse of medicines, and of all substances which act powerfully on the nervous system, and especially of green tea or of coffee, is occasionally, also, a cause of mental disorder.

317. *ζ.* M. Esquirol (*Mal. Ment.* t. i. p. 64., et t. ii. p. 682.) has given the following *tables of the causes of insanity*; — the *first* comprising only the physical causes among female cases; the *second* embracing both physical and moral causes in cases of both sexes at Charenton.

Physical Causes.	Salpêtrière.	M. Esquirol's Establishment.
Hereditary predisposition - -	105	150
Convulsions of the mother during gestation - -	11	4
Epilepsy - -	11	2
Disorders of the catamenia - -	55	19
Consequent on lying-in - -	52	21
Critical age - -	27	11
Progress of age -	60	4
Insolation - -	12	4
Injuries of the head	14	4
Fevers - - -	13	12
Syphilis - -	8	1
Mercury - -	14	18
Intestinal worms -	24	4
Apoplexy - -	60	10
	466	264

Causes, Physical & Moral.	1826.	1827.	1828.	1829.	1830.	1831.	1832.	1833.	Total.
Hereditary predisposition -	19	19	58	65	70	36	38	34	337
Masturbation - - -	7	9	7	7	10	3	3	6	52
Libertinism and excesses of all kinds - - -	8	8	8	12	25	15	33	37	146
Abuse of mercury - -	3	3	10	13	6	5	1	3	44
The abuse of spirituous liquors - - - -	22	17	25	11	16	10	18	15	136
Insolation, &c. - -	0	5	2	1	2	0	2	0	12
Injuries on the head -	1	1	2	9	3	2	1	1	20
Suppression of accustomed evacuations - - -	5	4	4	13	3	12	7	6	54
Suppression of habitual suppuration - -	0	0	0	0	1	0	2	0	3
Consequent upon parturition - - - -	2	3	5	8	1	2	3	4	28
Cerebral affections - -	0	0	0	0	0	6	6	5	17
Epidemic cholera - -	0	0	0	0	0	0	3	0	3
Domestic distresses, &c. -	38	22	29	26	47	38	40	38	278
Excessive study and watchings - - - -	2	3	3	2	2	1	2	1	16
Reverses of fortune - -	7	7	6	5	3	15	2	4	49
Gambling - - -	0	0	2	0	1	2	0	0	5
Jealousy - - - -	3	2	8	3	0	1	1	0	18
Disappointed affection -	12	9	8	2	3	1	2	0	37
Wounded self-love - -	4	1	1	2	3	2	2	1	16
Fright - - - -	1	0	4	8	14	5	2	1	35
Exalted devotion - -	7	9	2	1	3	1	1	0	24
Excessive joy - - -	0	0	1	0	1	0	0	0	2
Reading romances, &c. -	3	3	7	0	0	0	0	0	13
Political events - -	0	0	0	0	13	15	3	1	32
									1375

318. M. Esquirol remarks, that the causes were often ascertained with much difficulty; as the patients themselves were generally incapable of assigning them, and the friends could not always do so — at least, with any degree of precision. It is probable, however, that two or more causes were concerned in producing the effect, and that various circumstances were omitted; he considers that hereditary predisposition is much more frequent than stated in the above table. Under the head of domestic distresses, are included all the moral affections which are called into action in the interior of a family. The political changes in Paris, in 1830, gave rise to the cases from this cause, and to those produced by frights.

319. *n. Sol-lunar influence* was very generally supposed to excite or to favour the appearance of insanity, as well as to cause exacerbations of the malady. M. Esquirol could not verify this opinion by the results of his experience. It is probable, however, that electrical states of the air, or sudden vicissitudes of the atmospheric electricity, in connection with similar changes in the electrical currents through the body, have some influence on this malady. The effects of excessive cold and of great heat in causing madness, and the excitement produced in lunatics by atmospheric commotions, are indications of this influence. However this may be, there can be no doubt of marsh miasmata being a not uncommon cause of insanity, and especially of melancholia and dementia.

320. *C.* Various circumstances arising out of the manners and social and political states of a community may increase the frequency, or contribute to the production, of insanity. Still, these states are more or less connected with the affections of the mind and the other moral causes, or are resolvable into them. — *a.* The social conditions resulting from prevailing modes of education have been considered by M. Esquirol as most influential in increasing the numbers of the insane. Too much care is taken to cultivate the mind, not considering that the affections of the heart require equal care. In all classes, an education is bestowed upon the young, above what is suitable and proper to their station in society; and hence sentiments of ambition, and of discontent with their condition, are instilled into their minds from childhood. This early and ambitious education raises the mind of the young above, and too often in opposition to, the experience of their parents; and hence the opinions of the latter are despised or neglected. A person who has not been duly controlled in childhood is ill able to endure the vicissitudes and reverses to which an active life exposes him in the present state of society, — his passions being thereby deprived of a salutary curb, and his reason of its surest props, insanity often follows upon the least adversity. The manner of living in the easier classes of society,—the passion for dress, for exciting romances, for intrigue, for frivolities and amusements, — engender a constant thirst for excitement, and increase the frequency of nervous complaints and mental disorders. The vices, and the miseries and privations consequent on these vices, in the lower grades of society, have a no less marked influence in causing the latter of these effects more especially.

321. *b.* In country districts, the prevailing passions are less turbulent and exciting than in cities and large towns. Love, anger, and domestic contrarieties are the most frequent moral causes of mental disorder in the former; whilst, in the latter, ambitious views, speculations, disappointed hopes, reverses of fortune, excessive mental labour, watchings and late hours, greater depravation of manners, and more vicious indulgences, are added to these; and, consequently, insanity is more prevalent in populous, commercial, and manufacturing towns, than in rural places. In proportion as the latter causes are prevalent in any community, and are aided by a more or less general propensity to drunkenness, or to libertinism, or by the vices of education, and of conduct in the richer classes, and by the want of both in the lower orders, so do the disorders of the mind become more frequent.

322. *c.* Even *forms of government* have considerable influence in contributing to this result. There is not the least doubt of the ill effects of a too great freedom of public opinion and acts, and of public writing and speaking, upon mental sanity. With the freedom of opinion, and the latitude allowed to the expression of it, without re-

gard to the feelings and the interests of individuals, or to the morals and sympathies of the community, those emotions which most seriously disturb the mind, are brought into the most violent and distressing action, and the calm dictates of reason thereby overthrown. The political strifes, the popular elections, the borough and parish contentions, in this country, and in the United States of North America, furnish sufficient proofs, to the candid mind, of the truth of this position. The exciting, the contaminating, and the disgusting occurrences and circumstances, which daily, and even hourly, are placed before all classes in society, in most exuberant variety and particularity of detail, — the moral poison with which the whole is garnished, in the lowest, the cheapest, and the most diffusible of these vehicles of abominations, and of mental infection, — the liberty which contaminates the innocent, demoralises the public, injures the feelings, and benefits only the worthless and the base, — all tend to the consummation of the injurious effect upon the mental health of the community — to the increase of crime, of madness, and of suicide.

> "Here, by the bonds of nature feebly held,
> Minds combat minds, repelling and repell'd:
> Ferments arise, imprison'd factions roar,
> Repress'd Ambition struggles round her shore:
> Till, overwrought, the general system feels
> Its motion stop, or frenzy fire the wheels."

323. *d. Political commotions*, by exciting revenge, and the more violent passions of the public, by fomenting ambition, by rousing to intellectual exertions, and by overturning fortunes and the established order of things, have a marked influence in augmenting the frequency of insanity. The frights, terrors, outrages, distresses, and losses of fortunes, of friends, of honour, &c., consequent upon foreign invasions, sieges, and civil and domestic wars, are most fruitful causes of derangement on these occasions. Numerous proofs of this have been adduced by the French and German writers since the last war. Revolutions moreover do not only greatly increase the numbers of the insane, but also impart certain characters to the prevailing mental disorders. M. Esquirol observes, that, when the ancient monarchy was destroyed, many became mad from the loss of fortune and friends, and from the frights and terror caused by the consequent anarchy. When the Pope came to France, religious insanity was most frequent; and when Napoleon made princes and kings, insanity from ambition and pride was frequent, and kings and queens were numerous amongst lunatics. Religious revolutions have a similar influence; and even the prevailing ideas called into existence or activity by these revolutions, by great political events, and by popular commotions, contribute both to the frequency, and to the character, of this disorder. The prevalence and features of madness, during the Crusades, and for long afterwards; during the Reformation, in Germany, the Low Countries, and Great Britain; and during the civil wars, and the temporary domination of puritanism, under the long parliament and Cromwell; are illustrations of what I have just advanced.

324. *e.* M. Esquirol states, that a sedentary, indolent, or inactive mode of life favours the occurrence of insanity; and that persons who have been accustomed to a very active life, as merchants, traders, professional men, and soldiers who have led an irregular and an eventful life, are liable to this malady when they settle to the enjoyment of wealth and splendour.

325. *f.* Another circumstance of great importance presents itself in the relative frequency of insanity in the *married* and *single*. The following *Table* contains the results furnished on this subject by Esquirol, Desportes, Jacobi, and Prichard: —

	Desportes.		Jacobi.		Esquirol.	
					Charenton.	
	Salpêtrière. Females.	*Bicêtre.* Males.	Females.	Males.	Females	Males.
Unmarried - -	980	492	599	974	193	505
Married - - -	397	201	156	176	363	387
Widowers and Widows	291	59	80	30	69	40

The differences in these results depend much upon the classes of persons admitted into the institutions from which these results are obtained, and upon the limitations observed as to admission. Still, enough is proved by them to suggest important considerations connected with the hygiene and prophylaxis of insanity. With respect to the results which are here adduced, Dr. Prichard observes, that, as it appears probable that celibacy tends to augment the numbers of lunatics, an inquiry is suggested as to the manner in which this result ensues. Is it through the restraints which the condition of celibacy imposes, or through the vices to which unmarried persons are more frequently abandoned? M. Esquirol is of opinion, that, where one case of insanity arises from the former cause, a hundred result from the latter. A case occurred to me some years ago, of a well-educated man, hereditarily disposed to insanity, who, after long periods of continence, experienced symptoms premonitory of mania. He married soon after, having been under my care. Several years have since elapsed, without any indication of mental disorder having appeared. Persons happily married, generally lead more regular lives, in all respects, than the unmarried, and are more fixed in their pursuits and employments. In many other respects, also, the condition of married persons is much less favourable to the excitement of madness than that of celibacy.

326. In taking a survey of the feelings, the emotions, and the passions, as well as of the numerous circumstances connected with the social states, productive of insanity, the conclusion is irresistible, that the diminution of its frequency depends more upon the constitution of individual minds, proceeding from habitual control, and from a due exercise of moral and religious principles and obligations, than upon all other circumstances combined.

> "Vain, very vain, the weary search to find
> That bliss which only centres in the mind.
> In every government, though terrors reign,
> Though tyrant kings and tyrant laws restrain,
> How small, of all that human hearts endure,
> That part which laws or kings can cause or cure!
> Still to ourselves in every place consign'd,
> Our own felicity we make or find:
> With secret course, which no loud storms annoy,
> Glides the smooth current of domestic joy.
> The lifted axe, the agonising wheel,
> Luke's iron crown, and Damien's bed of steel,
> To men remote from power, but rarely known,
> Leave reason, faith, and conscience, all our own."

327. VII. Of the Physiological Pathology of Insanity.—i. Remarks on Mind and Organisation. — *A. Of the Scope of these Inquiries.* — The human frame respires, digests, thinks, wills, and acts: in a few hours afterwards, and often without any obvious cause, it performs none of these functions; and, in a few hours more, it falls into dissolution. These phenomena are familiarly known to us; and, although they are considered by all to form a part of the established order of the universe, yet they must have engaged the reasoning powers of man from an early period of his social history, and have been amongst the earliest subjects of philosophic discussion. As the cause of these occurrences is necessarily embraced by speculations as to the origin and nature of mental as well as of corporeal disease, so it may be supposed to have always been a matter of deep reflection to physicians from the earliest ages. The constitution of the human mind leads it to search after first principles, in order to explain the operations continually taking place within and around it; and the hopes of obtaining information respecting the source of the deranged states to which itself, as well as its associated frame, is liable, and even of discovering the nature of its own origin and connections, seriously interest a class of inquirers whose occupation naturally suggests these considerations. Yet, although these inquiries more immediately concern the practitioner of medicine, especially as respects the more obvious changes which mind and its allied matter present to his view, still the intimate relations of both the one and the other, the nature of the connection subsisting between both, and the more removed links of the chain which binds them to their first cause, and to the universal system of nature, are no farther disclosed to him, than to any one else who patiently scrutinises the objects which come under his view. As man did not create himself, so neither can the faculties with which he is endowed inform him, of themselves, even plausibly, either as to their own formation, or as to the original production of the frame which manifests them, or as to the connections which the one has with the other, or even regarding the ultimate cause and circumstances of the apparent dissolution of both. How can the machine explain the principles of its peculiar construction, or demonstrate the views which actuated its maker? How can we expect the powers of mind, which cannot be supposed to have been formed without a cause, to acquaint themselves of their own modes of being anterior to their present state of existence? and how much less can they furnish information respecting the nature of that cause from which they necessarily derived their origin! They may, however, enable their possessor to recognise the phenomena which take place within and around him. They can mark the modifications and the sequence of operations characterising their own constitution, and the properties of substances by which they are surrounded; and they may even expatiate beyond the objects of sense: still the powers of human intellect, exalted as they are, can neither, through their own instrumentality, arrive at a knowledge of their own intimate nature, or of the manner in which they first came into existence; nor explain, satisfactorily, the kind of connection which they hold with their first cause, on the one hand, or with the matter with which they are associated, on the other. Notwithstanding that the field is thus narrowed, it will be still found sufficiently extensive for exact research and profitable cultivation.

328. Although speculations respecting the nature and the material alliances of mind are sufficiently unprofitable, when directed to such topics as the above; yet, as they disclose points of great utility, when they are pursued in a different direction, they should not be altogether discouraged. It is to the medical philosopher that these points are especially manifested, and hence he becomes more particularly interested by discussions in which they are in any way involved. But, as his daily researches and occupations are apt insensibly to bias the opinions he may form as to those subjects, so his inquiries will often betray, upon strict examination, more of the *idola tribûs*, than of exact deduction. Besides this important source of error, there are others, in which he partakes in common with all inquirers. How very few physiologists are truly sound reasoners and exact philosophers! How often are the first requisites of valid argument overlooked, even at the outset of our researches after truth! How few, among those who peruse the discussions to which these researches lead, discover the sources of error! and how many are carried along with the sophistries which flow from these sources!

329. These objections, although strictly applicable to those topics to which I have alluded as being placed above the reach of our faculties, have, however, no reference to the correct observation of the healthy manifestations, and of the derangements of mind. The former topics, at the best, can be considered, from their very abstract, or rather, inscrutable, nature, as matters of curious speculation; the latter, being objects of consciousness and experience, are the true subjects of philosophy, and, from their involving the welfare and existence of human beings, are matters of practical importance in the scientific prosecution of our profession.

330. As our knowledge respecting life and mind can be derived only from a careful examination of the phenomena which organised bodies present, — for we have no experience of the former unassociated with the latter, — so our acquaintance with the manifestations of mind can be obtained only by an intimate investigation of the nervous system, and of its functions, in the higher animals and in man, and by attending to the objects of our consciousness. Of all the opinions which have been entertained as to the cause of vital phenomena, there is none in which these phenomena are not ultimately ascribed to one or other of two causes; namely, either to a certain organism of the materials of which the visible structure of the animal is composed, or to a principle totally distinct from, yet most intimately allied or associated with, it; which principle seems to have suggested itself to all mankind, and to have received a distinct appellation. Opinions have necessarily been similarly divided as to the cause and mode of existence of the mental manifestations; — the one being, that they result from the organisation of the brain and nervous system; the other being, that, like vitality, they are distinct from the structures with which they are associated, and which are the instruments only of their operation. Hence, physiologists are divided on this subject into two classes; — the

one ascribing all vital and mental phenomena to organisation; the other attributing it to a distinct principle — to vitality — allied to organisation, in which state of alliance only is it subjected to observation, and made an object of investigation and of experience. Accordingly, the one class believes that the range and power of intellect entirely result from organisation; the other considers that organisation is only the medium or instrument of mental manifestation, whilst it continues to be actuated by life — that the powers of mind are the result of the vital endowment of the brain. Although opinions on this subject may be thus classed, according to their general and fundamental principles, yet they vary remarkably in their subordinate particulars — owing chiefly to their discursions beyond the range of consciousness and observation, and into the regions of imagination and wild speculation.

331. The functions of the brain, in connection with the doctrine of life, have attracted the attention of philosophers from a very early period; and, during the last century, they have engaged the researches of some of the most acute inquirers who have "interrogated nature." The progress of our knowledge, however, in this very interesting but most difficult field has not been equal to the growing zeal with which it has been cultivated. This want of success is entirely owing to the circumstances already alluded to, — to the obstacles which beset us when entering upon investigations in which we encounter the mysterious union of mind with matter, and which relate to the more intimate states of both, and to their mutual influences in different and often in contradictory circumstances and aspects. The operations of the nervous system, possessing, as it does, so extended a connection with the mental powers on the one hand, and with the corporeal functions on the other, and reciprocally receiving and communicating influence during health and disease, could not be accurately traced, even in the more evident phenomena, without some reference to the sources and relations of vital and mental manifestations; and hence have sprung up various and conflicting hypotheses, which have demonstrated little beyond the narrow limits of our knowledge and of our powers. These humiliating considerations obtrude themselves, when we view the numerous speculations which have been entertained respecting life and organisation, and their relations to mental manifestation, from the earlier dawn of philosophy to the present time, when we consider the conclusions to which many of them lead, and when we reflect upon the small progress that has actually been made in this department of knowledge. How little has been added even to the physiological part of these researches, notwithstanding the self-felicitations of some recent inquirers, since the writings of Galen! how much of what has been supposed to have been discovered, still remains open to contradiction, cavil, and doubt! and what has the science of mind gained from the works of their modern followers, in addition to what appears in the discordant theories of Plato, Aristotle, and Epicurus! It cannot be a matter of surprise that human intellect has been tossed for many ages upon an ocean of uncertainty respecting its nature and relations, seeing that it was never guided by any sound principle of philosophising, by which it might have been navigated into a safe haven. Until the philosophy of Bacon extended, in this country, its influence to the science of mind, but little care was taken to attend closely to the intimations of consciousness, and to investigate the nature, the extent, and the mutual relations of our faculties. The more precise attention which has recently been paid by some writers in this country to the objects of consciousness, and to the origin and history of our ideas, whether those which are derived from our senses, or those resulting from reflection, will serve to guide our speculations to conclusions more correct, and certainly more ennobling, than many of those are capable of accomplishing, that have been entertained in modern times.

332. *B. The opinions of the Ancients respecting mind and the vital phenomena* were sufficiently vague; and yet, when strictly examined, not much more so than most of the views promulgated in modern times. Ψυχη, *anima*, vital principle, or soul, according to some, were employed by them to express the cause of the vital actions; the term ζωη designating the effect of that cause. Democritus, Epicurus, and the Stoics considered the soul to be corporeal, or material; but differed as to the matter constituting it. Hippo maintained that it was water; Democritus, that it was fire; Heraclitus, that it was a vapour, or exhalation; and the Stoics, that it was warm or ignited air. Of those who believed the soul to be incorporeal, some considered it mortal, and others that it was immortal. Thales said that it was the origin of motion, and always in motion; Pythagoras, that it was a self-moving monad; Plato, that it was conceivable only by the understanding; and Aristotle, that it was the first εντελεχεια, or element bestowing on others the possibility of life. The Manicheans imagined that there is but one universal soul, which is distributed in portions to all bodies. Plato and others maintained the existence of an universal soul, by whose influence all things existed; but that living creatures possessed separate souls, which have a threefold constitution, — reason, placed in the head as in a citadel, passion in the chest, and desire in the abdomen. The Greek philosophers, who taught the immortality of the soul, generally believed in its transmigration. Galen, adopting the doctrine of Plato, considered the soul to possess three faculties, located in the three cavities of the body, — a ruling or rational one in the head, a vital one in the thorax, and a natural one in the abdomen. These distinctions were long entertained in medicine, together with the subordinate faculties which Galen supposed to preside over particular organs, and which Harvey denominated *sensus proprii*, and Blumenbach, more recently, *vitæ propriæ*.

333. The Greeks, who believed in a vital principle, had long been accustomed to arrange its energies under different heads, as the φρην and the ϑυμος; the former implying the intellectual and voluntary functions, the latter the involuntary, which originate either in sensation or instinct. Some of their authors arranged the faculties of life under three heads, — the νους, φρην, and ϑυμος; the first comprising the intellectual and rational powers, the second those operations supposed to belong to the viscera of the thorax, and the third those spontaneous functions termed organic or vegetative, belonging to the organs of nutrition

placed in the abdomen. The Latin writers employed the words *mens, animus*, and *anima* in senses nearly corresponding with those attached to the terms used by the Greeks; although LUCRETIUS, in his developement of the Epicurean philosophy, is by no means precise in the use of them, and more generally employs *mens* and *animus* as synonymous terms, or very nearly as such.

334. EPICURUS, according to the explanations of LUCRETIUS, was the first who constructed a system of materialism. He ascribed organisation, and the vital and mental phenomena displayed by it, to combinations of ultimate and invisible atoms, possessed of various shapes. He does not attempt to show how these shapes co-operate to form either an animal or a plant. He merely asserts that the elements produce both from a combination of atoms; and that, in his time, many animals were formed, by showers and sunshine, out of the mud. This is one of the modes of spontaneous evolution contended for by some of the modern German physiologists. It being impossible to explain the manifestations of organisation and mind, and, indeed, of the universe, by means of the doctrine of atoms alone, a being of superior power was introduced, and invested with great authority. This being, who belonged neither to atoms, nor to elements, nor to any of their properties, was called Nature. "Her existence," observes Dr. BARCLAY, "being found indispensable to all the hypotheses that exclude a deity, she is still preserved in her high office by many of the moderns, and invested with great power, incessant activity, and uncommon prudence. She creates, and brings whatever lives to a state of perfection; and does it all according to method, or agreeably to laws imposed upon her by a higher power, which some call Fate, and others Necessity." We perceive the continual want, which EPICURUS and his followers experienced, in their speculations, of a first cause, one Supreme Being, to whom they might ascribe the various laws by which the world is governed; and we observe the manner in which his place is supplied by properties, powers, or principles, assumed by them to explain phenomena, which, notwithstanding this assumption, must be ultimately referred to one great first cause.

335. LUCRETIUS, the enthusiastic expounder of the doctrines of EPICURUS, after attributing all things to the formative and productive faculties of his atoms, of earth, of the elements, and of Nature herself, thinks, nevertheless, that all must be regulated by diversities of seeds, or of organic particles, each endowed with a peculiar *secreta facultas*, which makes them both living and organic. He is also obliged to conclude that the soul is deduced from a seed — that it is from its seminal qualities, and from this radical difference of its faculties, and not from a difference of organism in the body, that the lion is fierce, the fox crafty, and the stag timid. He rejected the opinion of those who believed that animating principles organised animal bodies; and because he could not see how they did it, he therefore concluded that they did it not. Aware, however, that he might fairly be challenged, in his turn, to explain how his seeds were originally organised, he is quite at a loss, and, forgetting the mechanical properties of his atoms, has recourse to heat, air, and the invisible power of the wind; being, nevertheless, obliged to call in to his aid a certain mobile and active principle, that distributes motion and sensation to them all; but the origin of this principle he cannot explain. The opinions of LUCRETIUS were evidently directed against the vulgar notions of the existence of divinities endowed with moral attributes; but they in no way influence the arguments in proof of a Deity, and a purer system of religion. He admits that it is impossible to disregard the religious feelings and impressions which are interwoven with the very stamina of our constitution; that no nation or individual is entirely without them; that some notions of divine beings are quite irresistible; and that they will spring up in the human mind as things indigenous, without the adventitious aid of education. "Quæ est enim gens, aut quod genus hominum, quod non habeat, sine doctrina, anticipationem quandam Deorum?"

336. *C.* OF MODERN MATERIALISM.—It has been urged by all the favourers of Epicurianism, and by many of the followers of GASSENDI and HOBBES, but more especially by BUFFON, PRIESTLY, DARWIN, MAUPERTUIS, BLUMENBACH, CABANIS, &c., that, as the manifestations of mind are never met with, unless connected with a brain, and are suspended by compression of this organ, so the phenomena generally attributed to it are the result of its organisation. That the combination and reciprocal action of the molecules of matter constituting the nervous fabric, of themselves, and unaided, produce the various powers of mind, is the proposition which they support, however paradoxical it may seem, but which they cannot explain. The possibility of such combinations and reciprocal actions of the molecules of matter producing, unaided, such results, is not shown by any analogy, or by any proof. If mind proceed from certain associations of organic particles, why has not some opinion as to the process been hazarded? Does our experience respecting the mutual influence of either the elements or the aggregate of matter furnish us with resulting phenomena, that can in any degree approach to the lowest manifestations of either vitality or mind? If mind be supposed to be derived only from the combination of these particles, or from the operation of certain of their products upon each other, it may be asked, whether it be possible to conceive that matter, in such a state, possesses qualities of which the elements, or even the individual atoms, are divested? and whether experience has furnished us with any instance of mental, or even of vital, phenomena, proceeding from such combinations, when matter is removed beyond the influence of bodies, or sources already endowed with life? If, on the other hand, properties necessary to the generation of the mental faculties be conceded to every particle entering into the formation of the encephalon, how can the idea of the subdivision of the powers of mind, to such an extent as matter admits of, be allowed? Can the supposition be for a moment entertained, that every molecule of this admirable organ has a fractional part of mind connected with it? Many of the materialists, in order to account for the manifestations of mind, have had recourse to so many suppositions respecting the nature and endowments of matter, in respect either of its elements or of its aggregate, as were tantamount to a negative admission of the principle of vitality against which they had been arguing, — with this notable difference, however, that they required the operation of numerous agents, instead of more

philosophically referring these manifestations to states of this first and noblest constituent of our nature. The genius of Leibnitz saw the difficulty that stood in the way of pure materialism; and, in order to give the atoms of matter activity, and origin to the mental phenomena, he had recourse to the εντελεχειαι, or spirits of Aristotle.

337. Cabanis and the later French physiologists adopted the doctrine of organism; and, in order to supply the want of a foundation to their structure, they seized with avidity upon the opinions of Gassendi respecting the origin of our ideas. Their hypothesis still required support; and, in order that it might receive such from a name looked upon with deference throughout Europe, they unjustly imputed to Locke, opinions which belonged to the two celebrated opponents of Des Cartes already mentioned. Much of the credit which this doctrine acquired in France and in Germany arose also from the neglect with which that class of our ideas derived from reflection was uniformly treated — from the circumstance, that the evidence of the senses and the information derived from experience were considered as the sole foundations of our knowledge. It is very justly remarked by Dr. Barclay, that, if it be supposed that all knowledge is derived from the senses, and that matter is the only object of sense, it must be evident that, on this hypothesis, we cannot with propriety ascribe phenomena to any thing but matter. But on what data is matter, in general, pronounced to be an object of sense? Its ultimate particles certainly are not so; and its aggregates, though many of them certainly are, seem but little calculated to account for life and organisation; and, at any rate, they by no means account for their own formation. But, whatever may be their formation or their consequences, they must be ultimately referred to those primary molecules which are utterly beyond the reach of our senses. Besides, if matter be supposed to include a variety of substances, or rather, every thing that has an existence, it is, on this supposition, no explanation of a phenomenon, to say merely that it proceeds from matter. He who hazards such an assertion, should point out the particular species or the peculiar arrangement from which it proceeds, otherwise he gives us no information, but that it proceeds from something unknown, and which he would wish to be called matter. We may, therefore, safely question the accuracy of the opinion, that all our knowledge is derived from the senses: as well might we say, that arts and manufactures are derived from the doors and windows of the houses by which the raw materials enter, to be afterwards prepared by the industry and skill of the workmen.

338. As our senses are prior in existence to our experience, we have still more reason to question another opinion, brought in support of materialism, namely, that all our knowledge is founded on experience; for a great number of our ideas are not directly derived from our own experience, but rather from the evidence of testimony. Besides, prior to experience, we possess a species of knowledge, which, as to self-preservation, is much more essential than any that we afterwards acquire, which seems to proceed directly from the Author of our being, and which, so far from being the result of our own experience and observation, is the very groundwork on which they are founded. Of this kind is the knowledge immediately derived from those natural instincts and feelings, which regulate the various functions of our system, which stimulate our intellectual powers, and which, according to their strength or their weakness, their healthy or their diseased state, impart a character to our experience, our observations, our reasonings, our conclusions. When we wish but to move a limb, by what experiment or process of reasoning do we come to know the necessary muscles, the particular nerves proper to excite them, or the amount of energy to be imparted to each, so as neither to exceed, nor to fall short of, the object in view? If we take a view of the instincts which guide animals to the selection of food suited to their digestive organs, — to know the appropriate means to overtake, subdue, or ensnare other animals, — to provide against seasons of scarcity, by laying up stores, — to know the distant countries and the different climates where food is in plenty, and to which they can migrate, — to learn that they can sleep during the winter without any food, and to select their retreats so as to avoid discovery, — to calculate the time of sexual intercourse, with reference to the periods of gestation, so that the birth of their offspring may coincide with the seasons suited to their early and future exigencies; — if we consider the age at which most of these phenomena are manifested in the classes of animals to which they severally refer, and the circumstances with which they are generally associated, and if we analyse the entire class of our instinctive desires and feelings (see note, § 66.), as manifested both in man and in the lower animals, we must necessarily infer, that the sources of our knowledge are much more extensive than the supporters of organism would lead us to believe. Let us, therefore, as Dr. Barclay has well enforced, give due importance to these primary causes of action and feeling; for whatever our reasonings or opinions may be, we will find them linked with some one or other of these original springs or energies of our constitution, — with some instinct, appetite, or passion, — with some one of those sources of action, which not only are prior to all our experience, observations, and reasonings; but, what is more, are, during our lives, not infrequently regulated by circumstances, external and internal, over which we have little or no control.

339. If such be the facts, what, then, it may be asked, is the use of experience, observation, and reasoning? The use of these in man is still great — great in proportion to the developement of the intellectual powers. These, and the instincts, can, to a certain extent, mutually aid, oppose, and regulate one another, so as to preserve a juster balance in the moral and social system. The instincts too, as well as the intellectual faculties, may be diseased, may be perverted, or may be deceived, as they have been shown to be in most of the forms of insanity; and in all cases where they point only to immediate objects, or act according to immediate circumstances, they give no warning of the snares, the troubles, and the dangers which are the consequences of indulgence. By following the impulses of instinct, to the neglect of experience and reason, passion and desire lead to acts of moral insanity. As we are able to ensnare, capture, or destroy the lower animals, by taking advantage of their unguarded, unsuspicious

instincts, so we ourselves are often ensnared and captured, or ultimately even destroyed, by excessively indulging many of our instinctive desires and moral emotions, and by neglecting the dictates of experience, just reasoning, and rational observation; or, in other words, from a want of that discipline of which the instinctive and moral feelings are susceptible, and which we have the means of administering, by possessing intellectual and reflective powers in a higher degree of perfection. The control of those feelings, however, is in proportion, not only to the perfection of these powers, but also to the use made of them.

340. I have been thus particular in noticing the opinions of EPICURUS, because they have the same basis, and involve the same principles, as modern materialism; and in showing that the doctrine of GASSENDI and HOBBES, which ascribes all our knowledge to our senses, and which has been seized upon by every writer of note who has more recently written in support of organism, is altogether unsound. — The scope of this work allows me not to pursue further this part of my subject, or to notice the several modifications of materialism which have been proposed in modern, and even in recent, times. This is, however, the less necessary, as what has been already advanced will show the complete insufficiency of any theory based upon organism to account for the phenomena of life and mind.* But I am compelled to examine briefly a modern doctrine which has met with a very favourable reception both in this country and abroad, and which has been applied, by those who favour it, to the study of insanity: — I allude to the doctrine of GALL, or Phrenology, or Cranioscopy.

341. ii. OF PHRENOLOGY. — Of this doctrine, I may observe generally, that some of its principles are founded on opinions which have been, and still are, very generally admitted by physiologists; whilst others, which especially belong to it, are assumptions, which even those who favour it cannot pretend to be proved, or at least expect to be admitted, by sound reasoners, as data sufficiently established. Those who support phrenology, appeal to facts, assert that it is eminently a science of observation and rational induction, and, with apparent candour, call upon those who oppose it, to make themselves acquainted with its principles and details, and then to observe and judge for themselves. This seems rational; but, unfortunately, when the advice is followed, and when the results militate against their theory, they endeavour to rid themselves of the difficulty, by asserting that the observer is mistaken, and unacquainted with the principles of their doctrine, — thus virtually denying that any one can be acquainted with it, unless he be likewise a convert to a belief in it. When, however, pressed by facts which seem irresistible, they have so many ways of eluding the difficulty, and especially by means of their notions respecting the *activity* and *volume* of the individual organs into which they have divided the encephalon, and the developement or activity of controlling, of opposing, and of co-operating organs, that there is at once an end of all argument with them. But the ability and eminence of many of those who have written in support of this doctrine, as well as the reception it has met with, and especially the very intimate relation in which it stands to the pathology and treatment of insanity, require that I should enter upon a more intimate examination of it.

342. That the seat of mind is the brain, is proved by a general consciousness that this is the case, or by a similar testimony to that of the locality of the various senses; and it may be further proved by experiment, — as by dividing any of the nerves, and by observing the resulting phenomena. The same inference is to be deduced from the injuries and diseases to which the brain is liable; by the different grades and forms in which the mind is disturbed, impaired, or its phenomena cease altogether. Whether we can more precisely assign the locality of the mind, or the localities of its different manifestations, than by saying, in general terms, that the seat of mind is the brain, is a question which has been long agitated; and it is upon the affirmation and negation of it, that the believers and unbelievers in phrenology rest their doctrines. It was formerly supposed that the mind was located in the pineal gland; but, as no evidence of this could be adduced, and as it could not possibly be proved by experiment, or supported by observation in disease, the opinion shared the fate of similar hypotheses. That the several faculties and propensities of mind reside in respective portions of the brain, is the fundamental proposition of phrenology. But, as Dr. PRING (*Sketches of Intellectual and Moral Relations*, 8vo. London, 1829, pp. 71.) has well observed, if we seek for the same evidence in support of this proposition, which showed that the brain in general is the seat of mind, no part of it will be found. In our perceptions of the objects of sense, — in the operations of mind, — in the study of music, languages, mathematics, &c., — in the exercise of our passions or propensities, — we have no consciousness of the portion of the brain brought into action; and we cannot thereby assign any of these to one part of this viscus, rather than to another, or distinguish whether the seats of these manifestations or states of mind are different, or the same for all.

343. The proofs of locality afforded by disease or injury are equally inconclusive — or, rather, are not to be found. Extravasations of blood in apoplexy will suspend the mental phenomena, or cause both them and life to cease, in whatever part of the brain they may occur. Whether such extravasation take place in the cortical, or in the fibrous structure, or in any situation; whether fluid is effused from the membranes, or into the cavities; and whether the organic effects of congestion, concussion, fractures, depressions of the cranial bones, inflammations, or softening of portions of the brain, or the developement of tumours, be contemplated, — we find only this common result, that all the phenomena of mind are more or less modified, or suspended; or they cease altogether. They may, however, be almost unaffected by some of these lesions; or some faculties and propensities survive, while others are lost; still the preservation or the loss does not observe any regular connection with the integrity or injury of any given portion of brain. — But to state with more precision and detail the doctrine

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* For an account of the various hypotheses which have been advanced to account for life and organisation, see the work of Dr. BARCLAY on this subject, and two articles by the author, in the 17th and 18th vols. of the *London Medical Repository*, 1822.

of GALL: — It is asserted — 1st, That the mind presents a certain number of faculties, passions, and propensities, all of which are individually exercised by distinct portions of brain, — which portions are the *organs* of these faculties or passions; — 2d, That these functions are performed, in their respective seats, in different degrees, in the same or in different persons; — 3d, That the strength or perfection of these functions or faculties is in proportion, individually, to the *size* of the organ, and to the *activity* with which it performs its office; — 4th, That these organs are situated in the superficial parts of the brain; — 5th, That in proportion to their size is the protuberance of the skull over them; — 6th, That by an examination of these protuberances, the size of the organs, and consequently the degree of perfection of their respective functions may be estimated; — 7th, That the individual functions may be developed or restrained by education; — 8th, That the preponderance of one or more of them may be repressed by the cultivation of others; — 9th, That the propounder of this doctrine was fortunate enough to discover the great majority of the situations in which the individual manifestations of mind are located, and that the rest have been since ascertained; — and, 10th, That the system is applicable to the prevention and treatment of insanity; mental disorders confirming the truth of it. I proceed to remark briefly on each of those assumptions.

344. *a.* The enumeration of the faculties may or may not be correct. Some of them are not simple, or even original, states of mind, but, as certain of the propensities, arise out of several, which more or less subserve to their individual formation. Then, as respects others, which are considered original and connate, the sphere of action is either too extended or too limited, whilst no attempt is made to trace them to simpler and more original manifestations. The division of the faculties by the phrenologists, moreover, is such, that explanations of character conformably with it, would lead us often to infer, that an individual both has and has not a particular genius, faculty, or endowment, or that he possesses opposite endowments in equal grades of perfection and activity, or that, both being equally developed and active, the balance vacillates between them till some circumstance affects a related faculty, and thus causes it or its opposite to kick the beam. The division of the faculties is opposed to just views of philosophising, and is altogether empirical.

345. *b.* That the faculties and propensities have their seats in particular portions of the brain, which portions are respectively the organs of the faculties and propensities, are two assumptions equally ill-founded with the foregoing. As the faculties of the mind are not distinct entities, but merely states or affections, arising out of impressions on the special or general sensibility, or different modes of consciousness, according as these impressions are internally and externally associated or related, so it is unnecessary to inquire whether these faculties have appropriate or respective seats in the brain. Our experience of what constitutes distinctness of function, in connection with organisation, does not permit us to extend the appropriation of function and organ to the mind and brain any further, than that our consciousness instructs us, that the brain is the seat of mind, or the organ which is most intimately related or associated with its various states and affections; but it by no means informs us, nor even suggests, that these states or affections are the functions respectively of particular parts of the brain, or that these parts are the organs individually destined to perform appropriate offices. Having no proof arising out of our physical and mental constitutions, how then are we to obtain any, or is any conclusive evidence to be obtained? We cannot obtain it either analytically or synthetically, compatibly with the continuance of life. Evidence, therefore, of the loosest kind — analogies, merely, have been advanced, in support of this assumption. As disease or injury has been found to destroy the functions of sense, when implicating either the origins or courses of their nerves, so it has been supposed, from this circumstance, that there are particular localities for the powers of the mind. But this, instead of suggesting the existence of such localities, merely indicates, that the impression from distant parts, or distinct organs, is conveyed by certain nerves, which, when diseased or injured in any part, from their origins to their terminations, are either rendered incapable of transmitting sensation so as to become an object of consciousness, or transmit it in a state of disorder, or imperfectly. Without further pursuing facts which abundantly suggest themselves to every physiologist and pathologist, it may at once be averred, that the proofs in support of the localisation of the faculties of the mind are not merely defective, but altogether wanting, and that the loose analogies which have been advanced, are either inapplicable, or admit of various explanations, none of which come in aid of the proposition.

346. Even admitting that the powers or faculties of the mind exist as separate essences or functions, and that they occupy appropriate seats or spheres of the brain, it by no means follows that these seats are the *organs* which give rise to these powers. The viscera discharging specific offices are denominated organs, because they are the agents, by the instrumentality of which certain results or phenomena take place when actuated by life; and we perceive a very obvious organisation appropriated to the office performed in the liver, kidneys, lungs, heart, &c.; but we are unable to show by what arrangement of the substance of the brain, a mathematical calculation, a process in algebra, a philosophical reflection, a cautious action, or a flight of imagination, is produced. Indeed, the question, whether certain states of mind, which the phrenologists have located in the brain, are really so seated, or should not rather be assigned to different parts of the nervous system, as they have been by most of the ancients, and by many modern physiologists, has not been duly considered by them, but at once have been assumed as *functions* of portions of the brain, which they have also assumed without any sufficient proof as *organs* individually appropriated to the performance of a certain function, and to that only.

347. *c.* It is asserted that the functions are individually exercised in different degrees of activity in the same, or in different persons; but is this owing, when occurring in the same person, to an accidental change in the state of the respective organ? or is the organ under the control of volition? or both? How does volition act upon each of the numerous organs? how is it located so as to bring

each or all into play? and does it run from one to another? or, seated in the pineal gland, or somewhere near, does it reach out certain appliances with which it is provided to each, and thus strike them in every variety of combination? If volition acts upon one, it must necessarily act upon all, or any intermediate number, in every possible mode of combination; and if this were the case, and the volition or desire comprehensive, how immense, both intellectually and morally, would be the result! If it be said that the will can act upon one organ only at a time, how then happens it, that several must often be in operation, to produce the effects which the phrenologists admit as often occurring? That persons may have talents for particular pursuits, or certain propensities, in a greater degree than others, is one of the oldest and best established remarks respecting the human mind. Our experience, however, warrants only the expression, that there is a stronger or a more favourable disposition in some minds, to certain operations, propensities, and passions, than in others. But, as Dr. PRING has observed, that the existence of any one propensity or faculty is independent of all the rest, or requires to be spoken of as more than a disposition of that which is expressed in the gross as the mind, cannot be inferred, — 1st, because the disposition which makes the propensity related with its objects, has the character of a common principle; — 2d, because the objects of a given faculty are presented to it through media — the senses — which are common to all the other faculties; — and, 3d, because one ability is not perfect, or in reality does not exist, without the concurrence, more or less extensive, of others. In truth, there seems little more reason for supposing that the different phenomena of mind are produced by numerous distinct faculties, than that it requires different hands to play different tunes upon a musical instrument.

348. *d.* That the strength of the faculty is in proportion to the size of the organ, is another fundamental proposition of the phrenologists, but an assumption, equally with the preceding, supported only by loose analogy. The only analogical proofs, indeed, which can be adduced in favour of it, are derived from the muscular and nervous systems; and these do not fully apply to the brain: for it cannot be stated with truth, even as a general proposition, that muscular strength, either in man, or in the lower animals, is in the ratio to the bulk of the muscles; nor is it universally true, that the largest nerves convey the greatest degree of nervous energy,—although they generally may be inferred to do this, since they are composed of a greater number of fibrils, each of which, or of the fasciculi into which they are arranged, transmits a certain amount of power, or rather of stimulus, to already inherent power in muscular parts. Moreover, sensibility, which is a principal property of nerves, is not manifestly greater or more acute in a large nerve than in a small one, or in a branch much less than a trunk. The phrenologists are themselves aware of the weakness of this part of their foundation, inasmuch as they have recourse to *activity*, or intensity of action, to explain phenomena which they cannot account for by means of volume. That the size and activity of function of the brain may be connected with the degree of mental manifestation, either singly or conjoined, may or may not be the case. The affirmative has been believed in for ages,—chiefly from the loose analogies already alluded to, and from others presented by various organs or parts. Still, this is the only part of the system which retains any portion of plausibility, upon a strict examination. The alternative, however, of size and activity, is so readily resorted to against the opponents to the doctrine, and so easily suggests itself, as to preclude all argument respecting alleged facts, in proof or disproof of the system, and to betray the mind of the espouser of it into a state of blind belief. It is obvious that, as long as size, relative and absolute, and activity and inactivity in every grade, are made bases of the doctrine, no fact, however faithfully observed, can be adduced, that will shake the faith of those who have embraced it; although every one who will give these articles of their belief due consideration, must come to the conclusion, that they actually negative the propositions they are intended to support: for, if activity of function be admitted as respects certain of the organs into which they have divided the brain, inactivity must be conceded to others, or even to the same organ on different occasions; and, if these states are so important, why have recourse to volume or developement as the principal indication of endowment or function? The shiftings between these states, in argument respecting alleged phrenological facts; the influence of allied or related propensities or faculties on those which are most prominent or most deficient; the countervailing operation of opposing organs; and the different interpretation that may hence be put upon the *ensemble* of these organs as manifested by the cranium,—must render the study, even if tolerably based in truth, as one, at the best, furnishing opportunities of vague guessings into character, in which no two speculators out of many may agree, or arrive at any thing like a just conclusion.*

349. *e.* The localisation of the organs, and consequently of the faculties, in the external or more superficial parts of the brain, whether suggested merely by a desire of detecting their volumes, or by the circumstance of these parts presenting a greater diversity of arrangement, or structure, or form, is immaterial, inasmuch as they both equally fail in supporting the assumption. That the superficial and cineritious portions of the brain are more intimately related with, or instrumental to, the manifestations of mind, may or may not be the case. We have no proof of a conclusive nature, either one way or another; although various circumstances and considerations, not amounting to evidence, have induced several writers to suppose that these parts are actually more especially subservient to the mental powers. Yet, that two or three convolutions, or two and a half, or one and a half, or half or three fourths of one only, should be devoted to one faculty or propensity, whilst the next convolution, or those severally surrounding the portion thus devoted, and even the fractional parts of convolutions not belonging to that portion, should be very differently, or even oppositely, employed, the ultimate arrangement of structure being the same in all, is certainly, if not the extreme flight of imagination, at least the highest

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* The author, before he was much known as a writer, had his head examined by several of the most eminent phrenologists of the metropolis, but there was no near agreement between any two of them as to his disposition.

pitch of hypothetical conclusion. Numerous other arguments may be adduced against this assumption; but they seem quite superfluous.

350. *f.* That the protuberance of the cranium marks, and is proportionate to, the developement or size of the particular organ of the brain underneath, often obtains, but not universally, or even generally. But this concession in no way supports the general doctrine, — even although the protuberance of the cranium truly and constantly expressed the volume, or rather prominence, of the part of the brain underneath. However, this correspondence very often does not exist, even in early life, for reasons that will suggest themselves to every anatomist. We find, moreover, and not infrequently, that there are prominences in the cranium, where there are underneath no corresponding developement of brain; and that the skull is impressed internally by irregular enlargements of the convolutions of the brain, and yet no external projection can be observed, corresponding with the concavities in the internal surface. But the phrenologists contend, as we have seen, that the size of an organ is in proportion to the strength of the faculty; and further, that a faculty, not naturally very strong, may be greatly strengthened by education or habitual exercise, even at advanced periods of life. Now, it may be asked, Is it to be expected that, at adult or advanced age, as the faculty gained strength, and as the organ, as they suppose, becomes increased in volume, the portion of cranium placed over it, will be protruded before it, so as to indicate the amount of increase? None but phrenologists could even dream of such a change as this in the skull at these periods of life. Here, however, they may shelter themselves behind activity, instead of bulk, or, if they still stick to the latter, and it evidently appearing that the bone does not yield to the growth of the subjacent organ, either the organ itself, or those around it, must be damaged by the consequent pressure — those in the vicinity must be atrophied, in proportion to the hypertrophy of the exercised part, and their functions injured accordingly, or even altogether annihilated.

351. *g.* It is evident, that the proposition directly based on the foregoing, — namely, that the strength of the faculties may be estimated by an examination of the projections and depressions of the skull, — requires no further remark. That faculties and propensities may be developed or restrained by education, is, and has long been, admitted, within certain limits. That the faculties acquire facility of action from exercise, provided that the exercise be neither excessive nor too long protracted, has been generally allowed. The passions and propensities also acquire strength from indulgence: but this is not regularly or universally the case; for, as remarked by Dr. Pring, a passion, which, in the earlier periods of its gratification, was vehement, might give place, after continued indulgence, to an apathy with respect to the same objects; and, in other instances, the excessive indulgence of almost any passion or propensity may terminate in disorder of it, or even in its imbecility, or total extinction. That the predominance of one passion or faculty may be restrained by the cultivation of another, is an old observation, which is not so universally correct as generally supposed, but which is received as an established axiom by the phrenologists, as it agrees with the belief in the distinctness of the individual mental functions, and of their respective organs. As respects the passions, we generally observe, that when certain feelings are frequently called into action, those which repress them, or are incompatible with them, are inactive, and less disposed to manifest themselves. This, however, does not extend to the purely intellectual powers; for, as regards them, we do not find that the cultivation of one power enfeebles the others; it merely tends to the formation of opinions unfavourable to the employment of another power. All that our existing knowledge permits us to advance on this topic is, *that certain modes or states of conscious sensibility or mind, being called into existence and action by their respectively related internal or external causes or occasions, these states continue to manifest themselves with an activity, generally corresponding with the intensity, character, repetition, and duration of these causes; and that a disposition thus to manifest themselves exists in proportion as they have been called into action, or thus exercised; other states of mind becoming inactive from the absence or insufficiency of those causes or occasions which are especially related to them, but assuming activity whenever these causes come into operation.*

352. This proposition is equally applicable to the intellectual faculties, and to the propensities or passions — to imagination, and comparison, and reasoning — to the benevolent and to the malevolent emotions; and is aptly illustrated by Dr. Pring, who remarks, that a disposition to cruelty may be repressed for many years, by a cultivation of the sentiments of benevolence, &c.: these sentiments may prevail until the age of thirty, when, from injurious treatment, or unfavourable observations of human nature, it may be suggested, that mankind are altogether unworthy objects; that they merit hatred rather than love; that, instead of the kinder offices, no species of cruelty is too bad for them. The original propensity would then be resumed, perhaps, even in greater force, from the contrasted sentiments which had been previously entertained, or from having been so long repressed.

353. *h.* It is obvious that, before the seats or organs of the faculties and propensities can be respectively assigned in the brain, it must be shown — *first*, that these faculties are severally distinct; and, *secondly*, that each occupies an appropriate and equally distinct portion of the brain. These propositions, however, have been already examined, and rejected for want of proof. Notwithstanding this, the phrenologists assert, that those persons who have certain faculties and propensities in a high degree, have certain protuberances on the skull, by which these faculties are denoted, — these protuberances being the external signs of the cerebral organs, and of their respective offices; and they support this assertion by the formation of the crania of those who had certain faculties and propensities in an unusual degree — these crania, as they aver, all having a protuberance for the same faculty in the same part or situation. But this practical application of their doctrine, upon the truth of which its utility entirely depends, altogether rests upon the facts which have been adduced in support of the proposition that the same faculties are always indicated by the same external signs, in respect of situation and developement. The number and correspondence of the facts, however, are denied by those who do not believe in

phrenology. It is obvious to those who think, that all physiognomical systems — that all attempts to establish a doctrine, by which the character shall be known from the external appearances of even a part, or of the body generally—may be supported, however *bizarre*, by a certain number of coincidences, which may be viewed as facts proving its truth. When we take into account the number of the mental affections and faculties, the diversity of intellectual and moral character, and the endless varieties of form of the head, face, and body, and of their expressions, it must be obvious, that any theory in which there is a reference of faculty to form, will necessarily find support in a large number of coincidences, — it cannot possibly be otherwise; and, if these coincidences be assiduously sought after, recorded, and marshalled as proofs of its truth, to the neglect of facts which disprove the connection attempted to be established, the theory will appear to many, and especially to those who are seldom at the trouble to think for themselves, a most brilliant discovery, — and the more so, that it promises an almost intuitive knowledge of character, and the most useful practical application. It is not denied, that some skulls present, in connection, — but, as far as the thing is yet proved, only in coincident connection,—certain propensities and faculties with certain external signs; nevertheless, it is confidently averred, that others evince no such correspondence between the mental character and the external form, and even contradict it in all, or in the most remarkable, of their respective parts. In the alternative, however, of activity, the cranioscopists have a refuge from adverse facts — and, as I have already hinted, from sound argument; and behind this, and various circumstances, — as controlling, deficient, inactive, and concurring organs, — they endeavour to intrench themselves. There are numerous other circumstances and considerations which strongly militate against the doctrine of GALL; but the scope of this work will not permit me to adduce them. The reader will find this topic more fully treated of in the able work of Dr. PRING already referred to.

354. *i.* The applications of cranioscopy to the pathology and treatment of mental derangement that have been made by those who believe in it, cannot be entertained; for, as it appears, from the reasons assigned above, and from others that might be adduced, not to be based in truth, such applications of it can only mislead, or interfere with juster views, or even be productive of irreparable mischief.

355. Having thus disposed of a doctrine which has received very considerable support, and which has been viewed by those who entertain it, as being of the greatest utility in understanding and managing mental disorders; although, even if most firmly based in truth, the utility of it in this respect is neither so great nor so obvious as they would wish it to appear; it further remains, briefly to consider the probable nature of the connection of the mind with the brain and nervous system.

356. iii. OF THE CONNECTION OF THE MIND AND NERVOUS SYSTEM.—*A.* Those who have reasoned against the possibility of the existence of the mind separately from the body, have referred to the general agreement of the state of the former with that of the latter, and to the effects produced in the manifestations of mind by disease and injuries of the brain, as proofs of the truth of their doctrine. But the inferences drawn from these two classes of facts, as Dr. PRING justly observes, are by no means legitimate. As to the first class of facts, showing a correspondence of vigour, at different periods of life, between the mental powers and the corporeal functions, it may be remarked, that the changes in these severally, although to some extent simultaneous, are not so universally, nor always in corresponding degrees: the faculties of the mind are sometimes unimpaired at far advanced periods of life, and the brain is fully developed long before the mental powers are in full vigour. Admitting, even, that the progress of the mind from infancy to old age is in general agreement with corporeal developement and strength, yet it does not *on this account* follow, that the changes of the mind, in the course of age, are *dependent* upon those of organisation. There may be a simultaneous developement without a necessary dependence. Besides, if the mental powers are entirely owing to the brain, — are merely functions of this organ, — wherefore are they not displayed at an equally early period of life with those of the liver, stomach, and other organs, — all of which manifest a perfection of function, either soon after birth, or, at least, long before the mental powers are fully developed? According to the doctrine of organism, no answer to this question can be given; whilst those who believe that, in the present state of our knowledge, it appears impossible for matter to give rise, of itself, to life or mind, and that a principle of vitality is necessary to the attraction of material or inorganised molecules into specific organised forms, and to be allied and associated with them for the purpose of enabling them to discharge appropriate functions, will readily respond, that in the early part of their existence, the brain and nervous system are the instruments chiefly, under the dominion of life and mind, of sensation, and of the instinctive feelings and emotions; and that, as fast as the mind is stored with the reports of the senses, — as fast as conscious sensibility is called into action, so as to form perceptions, and to perfect the results of sensation, — so it becomes also capable of retaining and comparing the objects of its consciousness, of reasoning and reflecting upon them, of suggesting new forms or combinations of them, and of drawing inferences from various sentiments or feelings arising out of the internal and external causes or occasions which influence or excite it.

357. The class of facts, consisting of modifications or suspensions of the mental powers, from organic lesions, and injuries of the brain, has been considered, by the supporters of organism, as conclusive proofs that the mind is a function merely of this organ, that can exist no longer when the fabric of it is destroyed. But it by no means follows, that, because those powers are destroyed by disease of the brain, they are, therefore, the product of the organisation of this organ. All we know is, that a certain degree of soundness of the latter is usually necessary to mental sanity; and that the mind shall be, in one case, severely disturbed by a slight change of structure; in a second case, but slightly disordered by most extensive disorganisation; in a third, unaffected by very remarkable lesions; and, in a fourth, most violently affected, without any appreciable alteration. Here, although the facts contended for are numerous, yet they neither correspond with one another, nor do

the lesions produce corresponding or co-ordinate effects on the mind; nor are the modifications of mind always to be referred to morbid conditions of the brain, — the results are neither uniform, nor correspondent, nor universal, — and hence the intimate dependence of mind upon the brain is not a legitimate inference from this class of assumed facts. The dependence of one thing upon another, it should be recollected, may be of different kinds: — 1st, It may be that of absolute cause and effect, — the latter existing only in consequence of the former, and ceasing with it; — 2d, The dependence may be one of association or connection, — in which state the one cannot be manifested without the other, and any disturbance of either will have a reciprocative influence. The dependence may be either of the foregoing kinds, and be greatly affected by the contingent interference of a third, or foreign influence, not requisite to the existence of either, and especially of that which suffers a change from such interference. Whilst it is the first of these that is contended for by many, the second appears to be the kind of dependence that naturally subsists between the mind and the brain; the contingent interference of morbid action in the brain disturbing the states of the mind, and the structural conditions of the brain itself.

358. The exercise of the faculties of the mind is dependent upon a cause which is allied with, or which actuates, the brain, and is modified or suspended in consequence of disease or injury of the brain, not because the integrity of this organ *produced* these faculties, but because the exercise of them is prevented by the foreign influence of a preternatural state of the organ with which they are allied. On this topic, Dr. Pring justly remarks, that in the case of disease or injury of the brain, followed by suspension of the functions of the mind, we do not know the agents or the mode by which such suspension is produced. We perceive a change in the condition of the structure; but whether the action of the mind ceases, because a material arrangement is disturbed, upon the precise state of which the action of the mind depended, as upon an essential cause; or whether this action ceases, because it is impeded by the foreign or preternatural influence of a fabric with which it is allied; we are precluded the discrimination of experience. Yet the alternatives have this important difference, — that, in the former case, the mind cannot exist without a precise arrangement of a material structure; in the latter, it may exist independently of such organisation; and, although liable to be disturbed or suspended by change of organisation, in the same manner as any other effect may cease under a foreign influence, yet its exercise may be resumed, when this influence is withdrawn.

359. The dependence of the mind upon the ganisation of the brain is said to be most unequivocally shown by the effects of *compression* of the organ; but compression, like organic lesions, may impair or suspend the manifestations of mind, whether they are a result of a certain state of organisation, or whether they are only allied or associated with it. In the former case, the effect is one of necessary dependence upon its cause, — the function ceasing upon a certain preternatural condition of the organ; in the latter, the foreign interference disturbs or suspends the condition of the material fabric with which mind is associated, and as soon as this interference and its material consequences are removed, the manifestations of mind are restored more or less completely, according as the removal of the foreign cause of disturbance is complete.

360. It follows, from what has been advanced above, that disorder or suspension of the manifestations of mind, from disease or injury of the brain, is no proof that the mind is necessarily a *function*, or an effect or product of this organ; but merely that the brain is the organ, instrument, or medium of communication between the mind and the external world.

361. In favour of the belief that the mind is independent of the material fabric with which it is intimately allied or associated, or is a result of vital properties superadded to, and actuating, this fabric, numerous considerations and satisfactory evidence, if my limits could permit, might be adduced; but it may be remarked, — 1st, That the circumstance of the opposite doctrine, or that of organism, having been found fallacious and untenable, the only other doctrine, by means of which the phenomena of mind and organisation can be explained, appears the more entitled to credit; — 2d, That mind ceases to be manifested in consequence of an organic lesion in a particular or limited part of the brain: if the mind were the result of the organisation, there is no reason why it should not still be produced, wherever the organisation is perfect; — 3d, That the principle or properties of life, endowing living animals from conception to death, and the structures which life endows and actuates, are undergoing a perpetual change, and, as existence advances, a perpetual consumption, without any loss of identity; that both the original vital endowment, and its associated structures, are perpetuated from inorganic or from broken down vegetable or animal substances, as from their elementary sources, — these substances containing the constituent properties or elements of life and of structure; that this conversion and appropriation of the elements of life and structure are performed by the changes produced in, and by the affinity or attraction exerted on, these elements contained in dead or inorganic substances, by life; and that this attraction is one of assimilation, by which a living principle separates, adopts and unites its own properties or elements, and those of its allied structures, from the various materials furnishing them, thereby perpetuating their forms, as long as their own identity or existence is preserved, and as long as their elements are submitted to the influence, or brought within the sphere, of the vital endowment, or principle, which alone is capable of thus acting; — 4th, That it is observed of *functions* generally, that they are the results of life in conjunction with structure — of organisation built up and actuated by the vital principle endowing it; that the function of every organ is dependent upon the continuance of its life; that it is not produced by the organisation, — for the material elements composing the individual tissues and the general organisation are held together in a state of affinity or attraction and cohesion opposed to that which their chemical affinities dispose them to assume; that this predominant affinity and cohesion are owing to a vital endowment, and are therefore aptly denominated vital; and

that, whilst it thus holds the material elements in a due state of attraction, appropriately to the constitution of the several tissues, it also enables them to discharge specific or peculiar offices or functions; — 5th, That, this dependence of function upon vitality existing throughout the body, a similar dependence of function upon vital endowment may reasonably be extended to the brain; — and, 6th, That the evidence we possess as to life being the cause of the organisation of material elements, and of its own perpetuation or renewal, as well as that of its allied structures; and as to its being a principle superadded to, intimately allied with, and actuating, a material fabric, and of which evidence such notice as the scope of this work will permit has been taken above (§ 336. *et seq.*), and in the article DISEASE (§ 2. *et seq.*), is sufficient to show, that the mind is the result of the vital endowment of the brain, without which endowment this organ would not only cease to be the instrument of mental manifestation, but would also fall into dissolution; its material elements, no longer being held together by the attraction of life, assuming those forms to which they are chemically disposed. According to this view, the evidence in favour of the immateriality of mind is the same as that upon which the doctrine of vitality, or the primary agency and controlling influence of life upon structural arrangement or organisation, and upon function, is based; and mind thus appears the highest manifestation or property of life, in connection with, and through the instrumentality of, the brain — that particular congeries of tissues, in alliance with which only could its wonderful faculties become apparent.

362. Matter is known to us only by our senses; mind, by our consciousness. We know quite as little about the essence and occult qualities of mind, as we know of matter; and, as far as our most profound conceptions of them can carry us, we have no ground for believing that they have any thing in common, beyond their derivation from parents, and the support or renovation they derive from surrounding media and materials furnishing the properties and elements of their developement, perfection, and perpetuation. The principle which thinks, as Dr. ABERCROMBIE remarks, is known to us only by thinking; and the substances which are solid and extended, are known to us only by their solidity and extension. When we say of the former, that it is immaterial, we simply express the fact, that it is known to us by properties altogether distinct from the properties to which we have given the name of matter, and, with the exceptions just adduced, has nothing in common with them. Beyond these properties, we know as little about matter as we do about mind; so that materialism is hardly less extravagant than would be the attempt to explain any phenomenon, by referring it to some other altogether distinct and dissimilar, — to say, for example, that colour is a modification of sound; or gravity a species of fermentation.

363. We have, in truth, the same kind of evidence for the existence of mind, that we have for the existence of matter, — namely, that furnished by its properties; and of the two, the former appears to be the least liable to deception. Of all the truths we know, says Mr. STEWART, the existence of mind is the most certain. Even the system of BERKELEY, concerning the non-existence of matter, is far more conceivable than that nothing but matter exists in the universe. To what function of matter can that principle be likened, by which we love and fear, are excited by enthusiasm, elevated by hope, or sunk in despair? These and other mental changes may be equally independent of impressions from without, and of the condition of the bodily frame. In the most quiet state of every corporeal function, passion, remorse, or anguish may rage within; and while the body is racked by the most distressing maladies, the mind may repose in tranquillity. The mind thus being so frequently uninfluenced by the state of the bodily organs, and so dissimilar and distinct from the functions of these organs, what reason have we to believe that it is dependent upon organisation, further than in being intimately allied with it, for the purposes of intercourse with the external world. When these purposes are fulfilled, this alliance is divorced; and as *mind*, the highest grade of vital endowment, is insusceptible of decay, although liable to be variously disturbed by diseases of its allied fabric, the connection ceases generally, in consequence of the state of this fabric having become incompatible with its manifestation. As soon as the *organic life*, or lower grade of vital endowment, or the properties of life actuating the organs of digestion, assimilation, circulation, respiration, and nutrition, and giving rise to functions subservient to the display of mind, by means of the brain and nervous system, cease to be exerted on their respective organs, the vital cohesion of all the structures ceases, and changes take place in the arrangement of their constituent elements. These structures, however, are not annihilated, their elements have only changed their forms; thereby furnishing an analogical proof, as remarked by Dr. BROWN, of the continued existence of the mind or thinking principle, — that it survives the disorganisation and changes experienced by its allied fabric, by means of which its properties or powers are displayed, and the various relations subsisting between it and the rest of the creation are established and preserved.

364. *B.* If we endeavour to inquire into *the origin of mind*, all the information which our faculties enable us to obtain, amounts merely to the following; — that, in common with the other properties of life of which the structures are possessed, it is derived from parents; is developed by the changes in the constituents of the ovum; is matured by the processes of growth; is allied with an appropriate organisation, or material fabric; and, like the other vital properties, subsequently manifests the phenomena which result from its own nature, and the agency of related causes. It is alone sufficient to establish, as Dr. PRING well remarks, the derivation of the mind from parents; that the being who exhibits the possession of it, is a production from parents; that he is so endowed by an internal conformation, the materials of which are obviously from parental sources; and that he is not cotemporary with parents, but is a production peculiar to a more or less advanced and perfect period of their existence. The peculiar features also of the mind of the offspring are often found to resemble conspicuous ones which belonged to the parents; or, like the hereditary peculiarities remarked in the structures, the mental characteristics of parents are not manifested in the succeeding generation, but remain latent, and

are displayed by the one which follows. Thus, insanity is as conspicuously transmitted from the parents to the offspring, as any one of the hereditary corporeal diseases. The association, however much or little, with the good or with the bad, with the well-informed or with the vulgar; the being familiarised with scenes or sentiments which captivate the imagination, or with topics which exercise the reason; or confinement to a sphere in which the mental impressions and exercises are little more varied than those of a horse in a mill, — will individually have an effect upon the character of the mind, and will concur, with previous relations of growth, to disguise its resemblance to the original from whence it proceeded.

365. From these and various other considerations, it may be inferred, that the embryo derives its vital properties from both parents, — those of either parent somewhat predominating in certain cases, and as respects certain properties; that these properties vary in grade, in different classes of animals, the highest of which furnish incontestible proofs of the possession of several of those faculties which we attribute to mind; and that the same grade of vital properties is communicated to the embryo as characterise the parents,—these properties developing, in the embryo, the material fabrics, or structural arrangements, about to become the instruments or media of their manifestation; mind, and especially the powers of association and reflection, being the highest grades of these properties, and requiring a more complete developement of the brain for their display.

366. C. If then the conclusion, that the mind is not a mere result of structural arrangement, is deducible from satisfactory evidence, it remains to inquire still further, *for the relation subsisting between the mind and the material fabric with which it is associated.* A perfect account of this relation is most probably beyond the reach of our faculties; but amongst various other topics it comprises much of what has already been alluded to, as well as a statement — 1st, of the circumstances upon which the existence of a mind or intellectual principle depends; 2dly, of the mode of its connection with the material fabric; — and, 3dly, of the mode by which changes or conditions of the mind, and of the organisation, affect each other: but to these topics I can only briefly and imperfectly allude.

367. *a.* Most of the circumstances upon which the existence of mind depends have been noticed, as far as they are known to us. It has been shown above that the powers of mind are the highest properties of life evinced through the medium of a perfect nervous system; that these powers, with the other properties of life, are derived from parents; that they are developed during the early stages of existence; that they become known to us only through the instrumentality or medium of a cerebro-spinal nervous system, actuated by the vital endowment of the frame; that the phenomena of mind are produced chiefly by relations subsisting between it and external objects, — by sensations transmitted to the brain and there disposed of, according to their relations with the other properties or powers constituting the intellectual principle or mind, and partly also by its powers of suggestion, abstraction, comparison, and reflection; and that the connection of mind with its material fabric is one of alliance, and not of necessary dependence, or of dependence only as far as the structure may be required as a medium between the mind and external objects, or may concur to its support or phenomena.

368. *b.* The *bond* or *connection* subsisting between mind and organisation can be viewed only as one of affinity or *alliance;* and the sole reason we can assign for this connection is, that it is a law of nature. We have seen, that this alliance is of such a kind as that the *existence* of mind is not necessarily dependent upon the material fabric; but that we are rather entitled to consider the organisation to be dependent upon life, mind being those manifestations of life evinced by the cerebro-spinal nervous structures, and resulting from the vital endowment actuating these structures; for it is impossible to conceive that an organised body could have come into existence without a vital or animating principle; and it is equally impossible to conceive how an animating principle, and more especially its higher properties or powers, — the faculties of mind, — could have been manifested or duly exerted, unless in most intimate alliance with matter, the molecules of which it could so build up and actuate as to render them the media and instruments of communication with the other materials constituting the visible world. When, however, the molecules of matter are thus built up, variously formed, and actuated, they are incapable of perpetuation, in their numerous and wonderful states, or even of more than a momentary existence, unless in alliance with, and endowed by, life — by that life which organised the molecules of matter, developing and perfecting them in their respective forms and grades of being. As soon as the alliance of life and organisation is divorced, the former escapes the cognisance of our senses, our unaided reason being incapable of acquainting us with its subsequent states of alliance or existence, and the latter returns to its elementary states. Thus we perceive, that organisation, with all its phenomena, is dependent upon life from its commencement to its termination, — its commencement resulting from the vital endowment bestowed at first by parents, and perpetuated afterwards by assimilation; its termination, ultimately, being consequent upon the loss or departure of this endowment, without which it can no longer exist. But, whilst organisation, with all its functions, is the result of, and is necessarily dependent upon, a vital endowment, in all its grades and manifestations, this endowment is not necessarily dependent upon organization, although associated with it in such a manner as fully and duly to actuate it; and this latter conclusion is supported by the reasons assigned above (§ 356.), as well as by the consideration that life, in all its grades, may exist independently of the material fabric which it actuates, although placed beyond the spheres of our senses. This is not above the range of conception or of probable existence, but admits of belief equally with other remote causes of visible phenomena; whereas the dependence of life and of its highest manifestations, or mind, upon organisation is incompatible with our experience of the numerous objects composing the external world, with our conceptions of possible phenomena, and with their causation, perpetuation, and termination.

369. *c.* The *mode* in which changes of the mind and of the organisation affect each other

can be only obscurely or imperfectly recognised; but, still, enough is manifested, to show—1st, That changes in the manifestation of the mind affect the organisation by primarily disturbing the functions of life in organs intimately related to the nervous system;—and, 2dly, That changes in the organisation affect the mind, in consequence either of the molecular arrangement of the material fabric, necessary to the healthy state of mind, being disturbed, or of the affinity or alliance existing between this fabric and its vital endowment being weakened or deranged, or of disorder of this endowment occasioned by the changes of its associated material fabric,—these changes deranging the manifestations of life usually evinced by the brain. Each of these propositions require further remarks.

370. 1st. In illustration of the influence of the mind upon the organisation, it may be stated that the depressing passions impair the functions of digestion, and weaken the action of the heart; and, if these effects are intense or prolonged, the organisation not only of the digestive and circulating viscera, but also of the brain, becomes affected through the medium of the nervous and circulating system. Here we perceive that changes in the functions of an organ affect both that organ itself, and also other organs related to it, by means of nervous and vascular connections.

371. 2d. If the structure of the brain be changed, the consequences are not uniform, either as to extent or character: there may result disorder—1st, of the mind; or, 2dly, of connected or related functions; or, 3dly, of both mind and related functions. Yet these consequences are not necessary or absolute, they are merely contingent—they are not constant or uniform, but uncertain and frequent: for numerous facts prove that the fabric of the brain may be most palpably and variously changed, without the mind being appreciably disordered; and that the most severe mental disturbance may suddenly occur, and as suddenly disappear, where no lesion of the organisation of the brain can be detected, or even inferred. These facts lead to the conclusions—1st, That changes in the mind, or vital manifestations of the brain, do not result uniformly, or even generally, from a disturbance of the molecular arrangement of this organ;—and, 2dly, That changes in the mind depend either upon impairment or other derangement of the affinity or alliance subsisting between the fabric of this organ and its vital endowment, or upon alterations in the state of this endowment, whether occasioned by lesions of its associated structures, or occurring independently of such lesions. To either, or both, of these alterations, disordered states of mind may be imputed; and either of them will explain the fact that these states of disorder proceed in some cases from alterations of structure, and in others without any appreciable alteration. They both—especially the latter—explain those sympathetic states of mental disorder which are of so frequent occurrence. Thus, the organisation, or even the function, of a remote organ is seriously disturbed, and the vital manifestations of the brain, or the mental powers, suddenly become more or less disordered, and as suddenly are restored to their healthy state. There is, however, no reason to conclude, that the material fabric of the brain is altered in such cases. All that we are entitled to infer is, that the change in the primarily affected organ has so disturbed the vital endowment of the frame, as to disorder in a special manner the manifestations of this endowment in the brain and nervous system; or, in other words, so as to derange the states of mind, or the various conditions of conscious sensibility, in relation to its internal and external causes.—From the preceding observations, and from numerous facts and considerations which my limits would not admit of being adduced, I may state the following inferences, as possessing more or less of practical importance, especially with reference to mental disorders; although their practical bearings may not be very obvious to the empirical or routine practitioner.

372. (1.) An organised being did not organise itself; the creature did not create itself, but was created; and all we know with precision, especially in respect of the origin of the more perfect animals, is, that they have proceeded from parents or anterior living existences.

373. (2.) Our present knowledge warrants the conclusion, that the derivation of organised bodies from parents depends upon certain material elements which proceed from both parents, and which are endowed, or associated, with a vital emanation from these parents,—the combination or mutual influence of these elements and of their vital endowment producing the new animal; and that the material elements furnished by the parents toward the production of their offspring, and vitally endowed by them, are of such a nature as to admit of conversion, under the influence of life, into those tissues more immediately required in the early stages of developement, and of separate existence, of the offspring.

374. (3.) Every consideration of the subject confirms this inference,—that not only does a vital emanation proceed from each of the parents, in connection with the material elements furnished by them towards the formation of the new animal; but also, that this emanation, or vital endowment, is possessed of properties, although in a latent or non-manifested state, similar to those possessed by the parent which furnished it; and that the vital emanations or endowments proceeding from parental sources, combine in producing the new animal, and form and develope the material elements with which they are allied or associated.

375. (4.) There is every reason to infer, that the embryo derived from these sources requires to be furnished, for a time, with those elements of assimilation necessary to its developement, and to its future state of independent existence; and that such assimilation and developement are accomplished by means of the vital endowments derived by both parents, although reinforced or promoted, or at least favoured, by the circumstances in which the embryo is placed in respect of one of its parents.

376. (5.) The animal, being thus organised by means of vital endowments derived from these sources, is afterwards supported by these endowments; the offices performed by each and every part of its frame, whether tending to the continuance of its existence, to the perpetuation of its species, or to communication with objects external to, and remote from, it, depending upon these endowments being weakened as they become impaired, or disordered as they are disordered, and ultimately ceasing immediately when they disappear or depart from the body which they thus preserved and actuated.

377. (6.) An organised body thus vitally endowed, presents an assemblage of organs, each of which performs, whilst actuated by life, certain offices or functions; their tendency or purposes being—1st, to continue the existence of the animal, by assimilation of the elements of matter external to itself; — 2dly, to perpetuate the species; — and, 3dly, to hold relations, more or less extensive, with the physical, and, in man, also with the moral or social, world. These organs or viscera are respectively endowed with life, which is either intimately associated with a general system or tissue, supplying all organs and parts of the frame, or is more generally diffused to all the structures, and even partially also to the circulating fluids; and they manifest this endowment in various modes, according to their organisation; their offices or functions being performed under the influence of life, and only by means of its influence, but through the instrumentality of the organisation. The functions of a living animal being thus altogether or entirely dependent upon life, these functions may be viewed as the manifestations or properties of life through the intervention or medium of the structures. Thus, irritability is a manifestation or property of life by means of the muscular system, and the various modes of sensibility are manifestations or properties of it evinced by a cerebro-spinal nervous system.

378. (7.) Conscious sensibility, in all its forms, and the intellectual and moral states, in all their varieties, arising from the relations of consciousness with its numerous external and internal occasions, are the highest properties or manifestations of life through the instrumentality of the brain—perfected, however, or called into existence or activity, by sensation, education, and reflection. These manifestations of vital endowment by means of a perfect nervous system, are the properties, powers, or faculties of mind, which are known to us only in alliance with this system.

379. (8.) The powers of mind, being, then, the highest properties and manifestations of life, through the medium of a perfect nervous system, are dependent upon the vital endowment of the frame, or result from this endowment whilst actuating its allied material fabric; the states of conscious sensibility, or of the mental principle, depending as much upon it as upon changes in the organisation of the brain itself. The faculties of mind are, therefore, manifestations of the vital endowment, through the instrumentality and medium of the encephalon: this endowment, in actuating this particular part of the fabric of the body, evincing these faculties, or mental phenomena. In this process, it is obvious that the particular conditions of the general vitality, whether as to power, or character, or quality, must influence the results, or the manifestations of mind, independently of any change, of an obvious or appreciable nature, in the fabric of the brain; and that disorders of mental manifestation will proceed as much from the conditions of the general vital endowment, as from alterations of the structure of the organ.

380. (9.) It having been shown above, that the vitality of the frame, as it endows and actuates the brain, is not necessarily dependent upon, but is merely allied or associated with, the brain, it follows, that changes of the structure of this organ may or may not affect the mental powers, so long as they are not of such a nature as to seriously disorder the vitality of the frame; and that, when the mental faculties are deranged in consequence of alterations in the fabric of the brain, the disorder is owing to the disturbance which such alterations produce in either the general or the local vital endowment, or both; the local lesion affecting either the general vitality, or that part of it endowing the encephalon more particularly, or both, contingently and frequently, but not necessarily or uniformly.

381. (10.) The alliance of the vital endowment with the material fabric being intimate, it may be inferred that affections of the one will disorder and ultimately change the other, when intense or prolonged—although in persons possessed of robust frames, and much vital energy, the disorder of either may be severe, without its associate being seriously changed. Intense affections of mind hence may, or may not, change the allied fabric, and *vice versâ*, according to the susceptibility of the system, and various other concurrent circumstances. This being the case, much of the structural lesion observed in old cases of mental disease, is as probably the result, as the cause, of such disease; the prolonged disorder of the vital endowment of the brain ultimately modifying the organisation of that structure or fabric which was the instrument or medium of the disordered manifestation. In such cases the mental affection will influence the general as well as the local vital endowment, although it is primarily merely a disordered state of that endowment, either generally or locally, and react upon it to such an extent as ultimately to change the allied fabric either of the brain or of remote organs.

382. (11.) As the powers of mind are manifested only through the medium of the encephalon, and are not the products of its organisation, — as they are the higher properties or manifestations of life only in alliance with, and through the instrumentality of, this organ, — and as affections of the vital endowment, or disorders of these manifestations, and changes of the intimate fabric of the encephalon, only contingently and frequently, but not necessarily or generally, disorder each other, — so it follows, that the amount of the disorder evinced by the mental power is no index to the extent or nature of the change existing in the brain, nor even a proof of the existence of any such change; and further, that the extent of change in the encephalon produces no correlative disorder of the mental powers; and that most extensive lesion may be present in the former, without the latter being materially, or even at all, disordered.

383. (12.) Although lesions of the brain are often evinced by disorder of the mental powers, they are more generally and certainly indicated by the physical disorder, or by phenomena displayed by distant, but related, parts. When lesions of the brain exist in connection with disorders of the mind, these lesions in respect both of their nature and extent, are indicated rather by the physical than by the mental phenomena; the states of the general vital power, or endowment, being kept in view.

384. (13.) Disorder of the vital manifestations of the brain being as dependent upon the states of the general and local vital endowment, as upon alterations of the fabric of the encephalon, or even more so, it follows, that the states of this endow-

ment, generally and locally, and in connection with changes of structure in various or remote, but related, parts, should form the bases of our pathology of mental disorders, as much as lesions of the fabric of the encephalon; and ought, moreover, to be the grounds and guides, as much as they, of our therapeutical indications, and the guides of our intentions and means of cure, whether hygeienic, moral, or strictly medical.

385. VIII. TREATMENT OF INSANITY.—There are few maladies which are more successfully treated than insanity, when the means of cure are promptly employed, and appropriately to the varying forms and features of individual cases; and there is none which requires, in order that all possible success should be obtained, a more comprehensive knowledge of morbid actions, of the disorders not only of the brain but also of the other viscera, and of the intellectual and moral manifestations, as variously modified, influenced, or disordered, by the predominant feelings, the manners, the prejudices, the dissipations, and the vices of society. In attempting to give a full exposition of the treatment of mental disorders, as far as the existing state of our knowledge will enable me, it will be necessary — *first*, to offer some observations generally applicable to the treatment of insanity; — *secondly*, to state the means which seem most appropriate to the different forms of the malady; — *thirdly*, to estimate the value of the principal remedies, in the several states of derangement;—and, *fourthly*, to consider the moral management of the insane.

386. i. REMARKS MORE GENERALLY APPLICABLE IN THE TREATMENT OF INSANITY. — It was formerly too much the practice to treat the insane according to a certain routine or system, without reference either to the causes, or to the form, of the malady; and the routine or system followed was generally based upon some prevalent doctrine applied to it, or some generally adopted system of pathology. Thus, the Ancients had recourse to drastic purgatives, and especially to hellebore; the discovery of the circulation of the blood led to the employment of sanguineous depletions; and the general adoption of the humoral pathology, at a still more recent period, was followed by a revival of the use of purgatives in this class of disorders. It must be obvious, however, to all who have observed the very different forms, the varying phases, and the numerous complications of these disorders, — who have viewed them in connection with their causes, and with their effects upon the organisation,— that they, of all maladies, require not only the most diversified, but also the most opposite means, according to the different *causes* and *kinds* of disorder, and to the changes observed in particular cases.

387. Each case of mental disorder presents certain circumstances, all which require calm consideration, in order that it may be successfully treated. —1st. *The causes*, whether moral or physical, predisposing or exciting, should be viewed, in respect of their individual and combined operation, — of their action on the system generally, and on the brain, or any other organ particularly, — and whether acting primarily and immediately, or secondarily and sympathetically. — 2d. *The state* and *stage of morbid action* ought to be ascertained, as regards both the grade of action, generally and locally, and the influence which such action seems to exert upon the manifestations of mind; —and, 3d. *The condition of the organic functions*, not only as it may be the cause of general and local morbid action, but also as it may be the consequence of such action.— On these circumstances are based those indications of cure which should be proposed when entering upon the treatment of every case of mental disorder. — 1st. *The causes should be removed, in ways appropriate to their nature and combinations.* — 2d. *General or local morbid action ought to be moderated, controlled, or removed according to its nature — whether it be increased or excited, or imperfect, or deficient.* — 3d. *The several organic functions should be promoted, when impaired; and restrained, when inordinately excited, either individually or collectively.* It is unnecessary to state here, how these intentions are to be severally carried into effect. The method or plan of procedure must necessarily vary with the circumstances characterising the different forms of the malady, and the individual cases of these forms; but the remarks which I have to make may be referred to each of these indications, and in their respective order.

388. *A. The seclusion of the insane* is a question of the first and greatest importance, not merely as respects the removal of the causes of disorder, although this is one of the chief points in which it should be viewed, but also as regards the physical and moral treatment. That every person who is more or less disordered in mind should be separated from those with whom he has been accustomed to live, and from his family and friends, and restrained from his accustomed habits and manners, and confided to the care of strangers, in a place altogether new to him, may not be affirmed universally; but the exceptions to this rule are not numerous, and should be made, in practice, with care and discrimination. As to the propriety of this measure, the most experienced physicians in Great Britain, and in foreign countries, are agreed. M. ESQUIROL remarks that recoveries are comparatively more numerous amongst the patients who come to Paris to be treated, than among those who inhabit that capital; for the latter are less completely isolated than the former.

389. *a.* The first effect of this measure is to produce new sensations, to change or to break the series of morbid ideas of which an insane person cannot divest himself: unexpected impressions are made upon him, arrest and excite his attention, and render him more accessible to counsels which may restore his reason. Generally, as soon as he is thus secluded, he is surprised and disconcerted, and experiences a remission of the disorder, that is of the utmost consequence in the treatment of it, and in acquiring his confidence. The change is not the less useful, observes M. ESQUIROL, in combating the disorder of the moral affections of the insane. The disturbance of the nervous system renders the sensations morbid and often painful; their natural relations with the external world are no longer the same as in health; all things seem disordered or overturned. The patient cannot believe that the cause of these phenomena is in himself. He is persuaded that every one wishes to contradict and irritate him, because they disapprove of his excesses: not understanding what is said, he becomes impatient, and puts an unfavourable construction on what is addressed

to him. The most tender expressions are taken as offences, or for enigmas that he cannot comprehend. The most assiduous care is vexatious to him. The insane patient, having become timid or sullen, suspects every one who approaches him, and especially those who were dearest to him. The conviction that every one is inclined to torment, defame, and to ruin him, increases the moral disorder. With this symptomatic suspicion of those about him, — which generally increases, without any motive or cause, from inevitable circumstances or opposition, and with the change in the intellects, — to allow the patient to remain in the bosom of his family might soon be followed by the most disastrous consequences, not only to himself, but also to others.

390. Where the husband suspects the cares and assiduities of the wife; or the wife those of the husband; and supposes that he or she is in league with those who conspire against him; — where the lunatic believes that the members of his family are the slaves destined to obey his sovereign commands; or are the ministers or apostles of his mission; — where the cause of the mental disorder exists in the patient's own family, or arises from dissensions, chagrins, reverses of fortune, or privations; — where the insane person entertains an aversion, hatred, or dislike to any member of his domestic circle, and, particularly, to any one who had been most dear to him; — or where the parent, or the son, the lover, or the friend, is impressed with the sentiment of his incapability of fulfilling the duties which he conceives to be imposed upon him, — the necessity and advantages of removal, and complete separation, from the object of his aversion, of his anxieties, or of his fears, are especially obvious and indisputable. The dislike entertained by the insane to those who had once been most dear to them, without either cause or motive, imperatively demands the removal of the patient, who generally readily becomes calm before, or attaches himself to, an agreeable stranger, owing either to the circumstance of his presence being unattended by any unpleasant association or suggestion, or to a feeling of self-love which induces him to conceal his sentiments and his state, or to the novelty of the impressions produced by strange persons and objects.—Whilst these are the chief inconveniencies and difficulties in the way of the treatment of the insane whilst they remain in the bosom of their families, there are great advantages to be derived from removal to a place suitable to the management of this class of patients.

391. *b*. But how should the seclusion or the separation of the insane be carried into effect? That it should be effected by means of an asylum or institution devoted to their treatment, in the great majority of cases, is generally admitted; although removal to such a place may be unnecessary in some instances, or unadvisable in others, owing either to the character of the disorder, or to the peculiar position of the patient — to the circumstances connected with certain cases. *Partial seclusion* or separation may be resorted to in some cases, and especially in those which are slight. A partial separation is when the patient remains in his own house, and is separated either partially or altogether from the members of his family and his friends, and is placed in the care of one or more suitable persons. Seclusion is more complete when he is sent to travel, or to make a voyage, in the custody of proper persons, or of one or more of his relations or connections. And it is *complete*, when he is removed to a residence altogether new to him, and surrounded by strangers, to whose care he is committed. Of this last kind of separation, there are several modifications; the chief of which are — 1st, A private residence, devoted to the patient and to those placed in charge of him; — 2d, A private asylum, containing several or many inmates; — and, 3d, A public, or large institution destined to the reception of a great number. In the great majority of cases, the seclusion, in order that it may be fully successful, should be complete; and the last of these modes, when provided with all the appliances and advantages which many of these now possess, is the most useful, as it conjoins, with complete separation from the relations of the insane, several arrangements and circumstances obviously beneficial. M. Esquirol remarks that the patient should be removed to an institution devoted to the treatment of mental disorders, rather than to a private asylum or residence. Partial isolation is much less successful, than that more completely afforded in a well regulated institution. The chief objection which has been urged against the latter, is the association with a number of companions in misfortune: but this is not injurious, is no obstacle to recovery, but is even of service, inasmuch as it causes the patient to reflect upon his condition; and, as the objects around cease to impress him, he is amused or distracted by those about him, is occupied by the objects passing around him, and thereby abstracted from what is apt injuriously to engage his thoughts. Large institutions, moreover, present greater facilities for the protection of the maniacal and furious, without having recourse to injurious or irritating means of coercion and restraint; and the attendants are more experienced in their management, than in a private house of detention. The advantages, however, of treatment in institutions of this kind depend entirely upon the medical acquirements and the characters of those intrusted with their management; upon the nature and completeness of the arrangements, therapeutical, hygeienic, and moral; and upon the organisation and discipline of the whole establishment. Still, there are cases, to which removal to institutions or asylums for the insane is not applicable, however ably they may be managed, and their inmates treated; and, to these cases especially, removal thence might be productive of injury, particularly if the seclusion were not modified according to the susceptibility of the patient, to the character of the disorder, and conformably with the passions, the habits, the feelings, and the modes of living and manners of those subjected to it. It is not to be considered as a measure which should be universally employed. In this, as in all other departments of medical practice, experience — that is, close observation of phenomena, a knowledge of all matters related to individual cases, and a comprehensive view, and weighing of circumstances — will generally decide correctly as to its propriety.

392. Example, which has so great power over the opinions and actions of man, also influences the insane, who are often not deficient in sagacity and in the power of comprehending what is passing

around them. The recovery, or the departure of a patient, creates confidence in others, and a hope of recovery, and restoration to liberty. The convalescents, by their conduct, and advice, console and encourage those who suffer, and thus are of the greatest benefit; one class of inmates of such institutions acting beneficially on the other, and favouring the success of the treatment. The calm, also, enjoyed by all; the moral repose arising out of removal from the habits, the business, the perplexing cares, the domestic anxieties and chagrins, and the irritating contrarieties, to which they were previously exposed; the regular mode of living, the judicious discipline, and the regimen, to which they are subjected; and the necessity of duly comporting themselves—of conducting themselves with propriety before strangers, and before one another, — all tend to suggest rational reflections; and become powerful auxiliary means of recovery. The cares and attentions which the insane receive in their own families are counted as nothing; but the attentions paid them abroad, or by strangers, are appreciated, because they are novel, and are neither due nor exacted. Hence the control readily obtained by those to whose care they are committed, when they are kindly and judiciously treated.

393. *c.* For melancholic and various forms of partial or slight insanity, complete separation is sometimes unnecessary, or even injurious. Partial separation, travelling, and various modes of exerting moral control, according to the peculiarities of the case, are often best suited to these states of disorder. Mania, and several states of monomania, demand complete seclusion. Dementy, imbecility, and idiotcy require more or less complete separation — at least from society. Complete seclusion is generally necessary to the poor lunatic; as he would otherwise be unprovided with the aid required to restore him to his family.

394. *d.* Separation and isolation act directly on the brain, — composing it to tranquillity, shutting out irritating impressions, repressing excitement, and moderating the exaltation of the passions and ideas. The sensations of the maniac are thereby reduced in number and intensity; and his attention arrested, and even fixed, by thus being reduced, by the novelty of those which are excited, and by their frequent repetition. The melancholic and monomaniac are torn away by it from their morbidly concentrated thoughts and ideas, and are directed to different objects or topics, — especially when proper means of distraction are had recourse to — when judicious moral management is conjoined with enlightened medical treatment.

395. *e.* In separating the insane from their families, the place of residence selected for them should be healthy, airy, and protected from cold winds, as well as from humidity and offensive exhalations. Their constitutions are generally more or less impaired and enfeebled, and they are consequently the more obnoxious to depressing influences and contaminating agents. They are generally predisposed to cutaneous eruptions, enlargements of the glands, and general cachexia; and they therefore require the more a dry and temperate, or even moderately warm, air. It is a grievous mistake to suppose that they are insensible to cold and atmospheric vicissitudes. Although they may not give expression to their sensations, their constitutions, and even the states of their minds, are remarkably affected by cold, humidity, and sudden changes of weather and season, — against which they should be completely protected.

396. *f.* The period at which the seclusion of the insane should terminate, is not easily determined. Experience of a diversity of cases and circumstances is the chief guide to a just conclusion. When this measure is found to be unavailing, after having been duly employed, the visits of near relations, friends, or former connections, may be tried; great discretion being used in the selection of those who are the first to be admitted to the patient. In such cases, the visit ought to be sudden and unexpected by him, in order that it may make the stronger impression. The utmost care should be taken in the admission of the visits of friends to convalescents; and, with them, suddenness and surprise should be guarded against. Upon the whole, it is preferable that seclusion should be prolonged, rather than that it should cease prematurely. This measure, moreover, ought not to be had recourse to in any state of delirium consequent upon, or symptomatic of, febrile diseases; and seldom in puerperal insanity.

397. *B.* To establish *the medical treatment* upon a sure basis, it is necessary to obtain as complete a knowledge as possible of the predisposing and exciting causes of the malady; to ascertain the physical as well as the moral sources and relations of it; to determine whether the physical occasions the moral, or the moral causes the physical, derangement; and to recognise the cases which will recover spontaneously upon separation or isolation and upon the removal of the causes, those which require chiefly judicious moral management, those which demand medical treatment, and those for which a combination of these means will be requisite. Regardless of these and various other important considerations, the medical treatment of the insane has too generally been conducted either empirically, or in the spirit of a narrow and exclusive system. Influenced by theory, or a predominant doctrine, some have referred mental disorders to inflammation, and have abused the various modes of blood-letting; others have believed that these disorders proceed from a morbid state of the biliary and digestive functions, and have disordered still more these functions and their respective organs by emetics and drastic purgatives; and many have considered the nervous influence solely in fault, and have attempted to correct it by means of antispasmodics and stimulants: hence the treatment has been nearly as often prejudicial as beneficial; and recovery has taken place, in many instances, *notwithstanding* the means that have been used, rather than *by the aid* of them.

398. *a.* When called to a case of insanity, the obvious duty of the physician is to ascertain the predisposing and exciting causes; the several circumstances co-operating with these causes, or contributing to their influence and intensity; the particular form or character of the disorder, its duration, and physical relations; the states of the several functions, organic and cerebro-spinal, and the connection that may exist between the mental disorder and the states of these functions, or of their respective organs. He will, moreover, observe whatever may exist of a pressing nature, or whatever indication there may be urgently re-

quiring to be fulfilled; as, for example, whether or not the signs of vascular determination to, or excitement in, the brain be obvious, and indicate impending risk to the organ; whether there be general vascular plethora or vascular inanition; whether some accustomed discharge, evacuation, or eruption has been suppressed; and whether or not the patient has been subject to some constitutional disorder, as gout or rheumatism. It is manifest that these are matters most necessary to be known, upon commencing the medical treatment of every case of mental disorder; and, without they are assiduously investigated, in no one instance can such disorder be appropriately treated. Where these more urgent indications exist, they require instant attention; — where the blood is strongly determined to the brain, the usual means of subduing the morbid action — local depletions, the cold affusion, or tepid douche or shower bath, external and internal revulsants and derivations, suitable diet and regimen, &c. — are requisite; — where the vascular system is plethoric or inordinately excited, sanguineous depletions, refrigerants, sedatives; evacuations from the bowels, the skin, and urinary organs; and low diet, are necessary; — where the catamenial or the hæmorrhoidal discharges, and eruptions or evacuations, either sanguineous or serous, or of other characters, have been suppressed, or have ceased to appear after the accustomed interval, the most active means must be prescribed, in order to reproduce them, or as substitutes for them.

399. *b.* Having removed the causes and concurring circumstances of the malady, — having thus fulfilled the more urgent and pressing indications, — and having remedied such morbid conditions of the organic functions as may have existed, — the more acute symptoms or stage of the malady will subside in about 8, 14, 21, or 28 days, or generally within 40 days, and a remission, or even an intermission, will occur. At this period, judicious and appropriate moral means should be brought in aid of the physical treatment; whilst the causes, moral, hygeienic, and pathological, ought to be removed or combated. If the recovery does not proceed satisfactorily, — or if these means, varied according to the particular circumstances of the case, do not produce beneficial results, — other remedies, sanctioned by experience, must be tried. These, however, will be fully noticed in the sequel.

400. *C.* As the malady thus lapses into a more or less *chronic form*, local or general manifestations of morbid action, which occasionally appear, return, or even remain, should be removed or suppressed by the usual and generally obvious means; and signs of disordered sensibility should be traced to their sources, and their pathological causes removed. Whenever disorder or disease of any organ in the abdominal or thoracic cavity is evinced, the fact of such disorder being frequently connected, either as cause or effect, with that state of the brain which occasions the disorder of its associated mind, should be kept in recollection; and an appropriate treatment ought to be directed to the quarter thus manifesting disordered sensibility or function, — always bearing in mind that morbid action in the substance of the brain is more frequently indicated by morbid sensations and disordered movements and functions in remote than in adjoining parts.

401. During the whole course of the treatment, the several organic and reproductive functions require attention. The state of the digestive organs, and especially of the biliary and the intestinal secretions, — and, indeed, the whole of the excretory functions — the fæcal, the urinary, and the cutaneous, — ought to be duly, or even daily, observed, and promoted whenever scanty or suppressed, or restrained when they become so excessive as to debilitate. More frequently, especially at the earlier periods of the malady, these functions require to be promoted; and as the defect, as well as the disorder, of these functions is often owing to impairment of the organic nervous or vital energies, the restoration of their healthy states should be attempted chiefly by means which will also invigorate these energies. With this intention, stomachics, tonics, or restoratives should be conjoined or alternated with purgatives, chologogues, or alteratives; and the bowels ought never be allowed to be confined, or the biliary secretion to be deficient. The appearances and the sediments of the urine should be ascertained, and alkalies or acids administered accordingly, with gentle stomachics and diuretics; and the action of the skin ought to be duly regulated by the cold, the shower, the tepid, or the warm bath, and by frictions and clothing, according to the form or stage of the malady, and the particular conditions of the cutaneous function. The states of the reproductive organs also require observation — especially of the uterus. And it should not be overlooked, that these organs are often abused by solitary indulgence, in such a manner as both to cause and to perpetuate the malady. Where this is detected, or even suspected, means should be contrived to prevent it. In advanced stages of insanity, although the treatment should be conducted, with reference to the removal of existing pathological states and of disordered mental manifestations, according to rational principles; still, when means thus devised fail of success, other and more empirical remedies, sanctioned by experience, ought not to be neglected. To these, however, sufficient reference will be made hereafter.

402. *D. The clothing* of insane persons, particularly of the melancholic, should be warm. In general, flannel may be worn next the surface; and dry friction every morning will be useful. The patient should sleep on a hair mattress, and hair pillow. His head ought to be somewhat elevated, and generally uncovered. The insane epileptic ought to sleep in a very low bed, to prevent accidents during a paroxysm. The propriety of devoting strict attention to cleanliness, in respect both of his person and clothes, is obvious.

403. *E. The food and diet* of the insane must necessarily be varied with the nature, complications, and stage of the disorder, and with the circumstances of particular cases. In the more acute attacks or stages of the malady, the diet and regimen ought generally to be antiphlogistic; at a later period, and in more chronic cases, and particularly in states evincing vital depression or exhaustion, the food should be more nutritious, in larger quantity, and easy of digestion; but hot spices and stimulants ought not to be allowed. During convalescence, the diet may be more substantial, but not heating; and duly regulated according to the exercise that is taken.

The meals should be at regular periods, and deliberately partaken of, and well masticated. A sufficient quantity of fluids should be allowed to assuage the thirst of the patient, which is generally urgent in mania, and in some cases of monomania; but they ought not to be given, unless when necessary, or when, in certain cases, a profuse use of them forms a part of the treatment.

404. *F. The management of convalescence* is one of the most difficult parts of the treatment of the insane. If the patient be not placed in favourable circumstances for some time after the subsidence of the malady; if he be not carefully and kindly watched; if contrarieties of mind, family dissentions, and all the remote causes, moral and physical, be not sedulously avoided; and if the diet, regimen, and mode of living be not suited to his constitution and the peculiarities of his late disorder, — the risk of a relapse will be great. At this period, and for long afterwards, much mental exertion or application, sudden bursts of passion, and excesses of every description, must be shunned; and the earliest manifestation of physical disorder — of headach, of disorder of the digestive organs, and of interruption of accustomed evacuations or discharges — should be met with local depletions, purgatives, revulsants, diaphoretics, and other means appropriate to the nature of the disorder. As convalescence proceeds, change of air and of scene, and travelling with a suitable companion, or one capable of amusing, fortifying, and even of controlling the mind, will be most beneficial; and such mineral waters as will promote the secretions and excretions, and at the same time strengthen the constitution, without exciting or heating the circulation, or determining the blood to the head, will often prove of essential service.

405. *G. The measures proper to prevent insanity, and more especially a relapse or return of it*, are most obviously presented to the reader in the full exposition I have given of the predisposing and exciting causes. The avoiding of these constitutes the chief, and, indeed, the only, *prophylaxis.* Young persons, whose parents have been the subjects of this malady, should have especial attention paid to both their physical and their mental developement; and whilst the former is promoted by exercise in the open air, and healthy occupation, the latter should be cultivated, without being over-exerted, and sound religious and moral principles ought to be inculcated; care being taken to avoid indulgence of the caprices, passions, and selfish feelings. The instruction of these persons should not be premature; but the desires and passions ought to be early restrained. The judgment should also be early and judiciously informed, without fatiguing the mind; and the control of parents or guardians ought to be prolonged for a considerable period after puberty, and until the mind, conduct, and constitution are fully formed.

406. ii. OF THE TREATMENT OF THE SPECIFIC FORMS OF INSANITY. — *A.* PARTIAL INSANITY. — *The simpler forms or slighter grades of insanity* severally require a moral management, as well as a medical treatment, appropriately directed to their different states and characters, — which, however, are so diversified as to preclude the possibility of my considering the subject with reference to any but those which are the more common and prominent. — *a. In the various states of moral insanity* (§ 69. *et seq.*), in which the patient is not labouring under any illusion, or erroneous conviction, or disorder of the understanding, the propriety of *seclusion* cannot be decided upon, excepting with reference to the features of, and the circumstances connected with, individual cases. Many of these states of moral disorder, consisting chiefly of errors in action and conduct, are not of that grave and well-marked kind which is considered in the eye of the law to require the privation of liberty; although, in the majority of such instances, the conduct of the patient may be such as will prove the most injurious to himself and to those depending upon him. In other less questionable cases of derangement, and where the disorder is so restricted as to leave the patient, according to appearances, the exercise of a great portion of his reason, it is often difficult to come to a determination as to the propriety of seclusion. The opposition which the patient may experience, may endanger the portion of intelligence that remains. It is as unnecessary as it is cruel, to deprive a person oppressed by distressing feelings, or prone to terror or alarm, of his friends and relatives — of the attentions of his family — as long as he entertains no vindictive feelings or dislike to them, and especially as long as his actions may be reasonably controlled by them.

407. *α.* In the state of gloom and mental depression to which some persons, the subjects of moral insanity, are prone (§ 73.), seclusion may be productive as readily of mischief as of benefit. For these, travelling, visiting watering places, medical treatment, the kind intercourse of those to whom the patient is partial, and the watchful attentions of the members of his family, or of those accustomed to attend upon persons in this state of mental affliction, should be tried before seclusion be resorted to. When suicide is contemplated, seclusion and control in an asylum will prove more successful than the most careful attentions in the bosom of the patient's family. Still, in the majority of such cases, this measure will be more successful chiefly in respect of the safe custody of the patient; for none besides will be equally secure. The most vigilant keepers may be deceived by him, when he is otherwise at large.

408. *β.* When the disorder is characterised by unnatural excitement (§ 74.), seclusion and confinement are often requisite, and are generally successful by inducing reflection. When persons thus affected have a propensity to intoxicating liquors, accessions of mania being thereby occasioned, seclusion is necessary; but upon the restoration of liberty the morbid disposition returns. In all cases of moral insanity where the morbid propensity is dangerous to the patient or to others, this measure becomes indispensable. When the disorder assumes a religious character (§ 75.), travelling, society, and a suitable moral and medical treatment, are preferable to seclusion; and confinement ought not to be resorted to, unless suicide have been attempted or contemplated.

409. The treatment of all the forms of moral insanity ought to be essentially, although not exclusively, *moral.* Comparatively few instances of these do not present more or less of physical disorder, seated either in the head itself, or in

some organ with which the brain sympathises. Of this I have already adduced sufficient evidence (§ 92—94.). The moral treatment, in all these, must be based upon a knowledge of the remote causes of individual cases, and should vary with the circumstances of each. It is impossible to state here in what this treatment should consist, with reference to such circumstances: the subject will be as fully treated of hereafter as my limits will permit. Wherever physical derangement can be detected, or to whatever organ it can be referred, appropriate medical means should be directed against it, whilst the patient is enjoying the advantages of a suitable moral management. The general health should receive due attention; and the functions of digestion, secretion, and excretion be duly promoted. Due restraint ought to be, as far as possible, imposed upon the passions and emotions; and change of air, wholesome exercise, and interesting occupations be prescribed.

410. γ. *The treatment of erotomania* should have reference chiefly to disordered circulation in the brain occasioned by an excited imagination and protracted desire, in connection with great susceptibility of the nervous system generally. If this affection be not alleviated, it will pass into more general disorder of the mental powers — especially into melancholia, mania, or some form of dementia. When it occasions emaciation and hectic fever, thereby menacing the life of the patient, marriage may be suggested. In this, as in nostalgia, the accomplishment of the desires of the patient is the chief or only remedy. When the object of desire is concealed, every art should be tried to ascertain its nature and source; as the effects upon the mind that will consequently result may be of much service, and a moral influence may be exerted over the patient with greater advantage. Where marriage is impossible, change of scene, travelling, society, and the amusements of watering-places, a tonic and restorative treatment, healthful and pleasant occupations, exercise in the open air in agreeable company, and suitable diet and regimen, are chiefly to be depended upon. When there is any evidence of increased determination of blood to the head, in this, as in other forms of moral insanity, and especially when the scalp is hot, or the eyes injected, the tepid or cold shower bath every morning will be found of great service.

411. δ. *The morbid propensity to intoxication* (§ 86.) is often attended by symptoms indicating not only a state of irritation of the stomach, but also a general depression of the nervous power. In this state, tonics, with small doses of ammonia, may be used with advantage; and, in order to counteract the injurious effects of the intoxicating fluids upon the system, to prevent the disorder from leading to more general and severe derangement of mind, and to disgust the patient with these fluids, tartarised antimony, ipecacuanha wine, or other nauseating drugs, and even the extract of elaterium, or croton oil, may be added to them before they are partaken of by the patient. In two cases, one of which I attended with Mr. Hood, this method was found successful in causing a loathing of these fluids, in moderating the mania consequent upon the use of them, and in permanently restoring the patients. In both these cases, seclusion, and a sufficiently permanent and close restraint, could not be conveniently put in practice: this plan was, therefore, tried in the first instance, and succeeded in causing a distaste of all kinds of intoxicating liquors. To succeed, however, by means of it, requires great care and management on the part of the friends of the patient.

412. ε. *Homicidal insanity* (§ 89.) *and incendiarism* (§ 88.) are generally dependent upon an irregular activity of the circulation, or a morbid state of vascular action — especially in the brain. They are both frequently connected with disorder of the uterine organs, or suppression of the catamenia; and, in males, with derangement of the digestive organs, and with sanguineous determination to the head. Medical treatment in these cases is mainly to be trusted to; for the morbid impulse to commit these crimes is often so violent as to be instantly carried into effect, either before moral restraint can be exerted to counteract it, or because this restraint is habitually so feeble as to be inefficient, or is not roused to the least degree of activity. The impulse to perpetrate such crimes may, indeed, be looked upon as one of the modes in which physical disorder of the brain, arising either primarily or sympathetically, deranges the manifestations of mind,— those sentiments or propensities which circumstances have called into activity being thereby disordered or morbidly exalted. In many instances, also, there is reason to believe that the morbid impulse to commit crime is only the climax of an habitual indulgence of passion and feeling, to the constant neglect of moral principle and restraint; and is a tolerably obvious consequence of cerebral excitement, the effects of which are determined or manifested in this particular manner or direction, owing to various predisposing and concurring sentiments and circumstances.

413. In these cases, local or general depletions, according to the amount of local or general fulness, or of increased vascular action; the cold douche, cold affusion, or shower bath; active purgatives, revulsants, and derivatives; antimonial and other diaphoretics; digitalis and other sedatives; and the promotion of the secretions and excretions generally, — constitute the chief principles of treatment; aided, however, by a due moral influence, and by proper mental and physical occupation.

414. *b. Partial disorder of the understanding* (§ 95.) appears under so various and numerous forms as to require a treatment appropriate not only to each of these, but also to individual cases. Each patient should be a particular subject of study, and the moral and physical treatment directed according to the character and stage or duration of the disorder, and the various circumstances connected with its developement. — *a. Hypochondriacal monomania* is generally an extreme state of *hypochondriasis*, and more or less intimately connected with physical disorder, commonly commencing in the digestive organs, and consecutively affecting the brain. The treatment should not be materially different from that which I have recommended for that disease; and the *hygeienic means* there advised (see Hypochondriasis, § 50.) especially should be adopted. In the majority of cases, complete seclusion will not be necessary, unless the patient contemplate or attempt suicide. More generally, however,

travelling, change of scene and of air, horse exercise, agreeable occupations, hunting, the amusements of society and of places of resort, — especially when attended and controlled by friends or suitable persons, — will be found most conducive to recovery, particularly if an appropriate medical treatment, and the use of mineral waters of a restorative and deobstruent or laxative kind, be pursued at the same time. Every method should be tried, and especially those just mentioned, to abstract or seduce the patient's attention from those feelings and ailments with which his mind is exclusively and morbidly occupied. The strictly medical means should be varied according to the peculiarities of individual cases; and the more urgent symptoms should be palliated by suitable remedies. The bowels ought never be allowed to become costive, and their functions should be promoted by aperients, conjoined with tonics, carminatives, and deobstruents. All the secretions and excretions should be duly promoted. Flatulence and gastrodynia must be allayed by magnesia, the hydrocyanic acid, gentle tonics, &c. variously combined; and by spare diet, consisting chiefly of warm milk, with bread or boiled rice, or other farinaceous articles.

415. *β. The treatment of melancholic monomania* (§ 106.) is most difficult; and, to be successful, requires a strict examination of the physical and moral causes of each case, and an appropriate employment of moral, hygeienic, and medical means.—(*a*) *Moral treatment* is of the greatest importance in this form of insanity, and in all its modifications, whether religious, or demonomaniac, or misanthropic, melancholia, or any other it may assume; but this part of my subject will be more appropriately considered hereafter.

416. (*b*) The *hygeienic measures* that may be resorted to, consist chiefly of attention to climate, residence, exercise, clothing, and diet. The patient should *reside* as much as possible in a moderately warm, or temperate, and dry air, or in a mild climate and a clear atmosphere; and if he must abide for a time in a place where these advantages are not enjoyed, he should choose spring and summer, and migrate during autumn to the milder climate, where he should reside during the winter and early spring months. The patient's *clothing* should be warm, and consist of flannel nearest the skin; and this should be frequently changed. As melancholics are subject to cold feet, these parts should be carefully protected.

417. (*c*) *Seclusion*—at least, complete seclusion — should be prescribed with great circumspection. There can be no doubt of its propriety when suicide is contemplated, or has been attempted. But in other cases, partial seclusion, particularly in connection with agreeable and interesting occupation, and amusement, is more safe and beneficial. Seclusion, however, even when complete, often re-establishes the moral powers, and the reasoning faculties, when they are exhausted by indulgence of the passions and desires.

418. (*d*) *Exercise* and suitable *occupation* are very important parts of the treatment of melancholia, and of all the states of partial insanity. Travelling, voyaging, — especially to a considerable distance, and with a fixed object, or with feelings of interest in what may result or occur, — is one of the best means that can be devised. Exercise on foot or on horseback, regularly taken, so as to promote the cutaneous excretion; occupations in the open air, which are attended by moderate physical exertion and mental excitement; hunting, shooting, and games of skill and activity, as cricket; and farming and gardening,—are severally of great benefit. The chief objection to the last of these, is the occasional stooping necessary to several of its duties. Billiards are also useful means, both of exercise, interest, and amusement. Whatever moderately excites, interests, and occupies the mind, is serviceable in the treatment of melancholia; and especially if it at the same time abstract the attention or imagination from the object of its illusion. When *music* is properly selected, and prosecuted so as to accomplish these objects, the advantages that may be derived from it are great. As to the selection of modes of occupation and exercise for individual cases, much should depend upon the patient's previous and existing tastes and habits. A principal intention in this class of disorders — in all forms of partial insanity — is, to detach the patient's attention, his mental devotion, from the object on which he has morbidly fixed it, to seduce it to other objects, and to engage it with different subjects and matters of interest and importance.

419. (*e*) *The diet* of melancholic patients should be light, digestible, and moderately nutritious. Salted, highly spiced, irritating, and oily or fat articles of food ought to be always avoided. The food should be simple, plainly dressed, consisting of very few articles at the same meal. Ripe and fresh fruits, in due season, may be allowed. The quantity and kind of food should have reference to the amount of exercise. When this is so great as to freely promote the cutaneous, biliary, and alvine evacuations, a more liberal diet may be permitted than in other circumstances. Great circumspection is requisite in allowing this class of patients restorative or exciting liquors. If the head be cool, and the action of the carotids rather below than above the healthy standard, these may be tried in small or very moderate quantity, and their effects observed. Generally, however, the influence of gentle tonic and restorative medicines should be previously tried.

420. (*f*) *Medical Treatment.*—The physical disorder requires, simultaneously with the adoption of the foregoing measures, and of suitable moral means, a judicious recourse to remedies calculated to promote or to correct the functions of the digestive organs, and, indeed, of all the abdominal viscera. There are very few of these viscera which have not betrayed more or less of disorder even long previously to the developement of the mental affection. The functions of the skin are usually impaired, and often require the tepid or the warm bath for their restoration. The alvine excretions— especially the intestinal — are generally retained, or voided imperfectly or with reluctance, owing manifestly to relaxation of the muscular tone of the bowels, and especially of the colon. The secretions are also deficient, and morbid from their retention. These physical conditions require for their removal the frequent use of aperients and laxatives, conjoined with tonics and other restoratives; for their continuance would increase that state of excrementitial plethora of the vascular system in which melancholia and hypochondriasis often originate, by depressing and disordering the vital manifestations of the brain. Even the urinary

secretion is deficient; the discharge of the more excrementitious materials from the blood by the kidneys being partially interrupted, or deficient in respect of certain of the constituents of the urine. In most instances, the morbid materials carried into the circulation, or accumulated in it, owing to defective powers of digestion and assimilation, are not sufficiently discharged from it by the action of the kidneys, bowels, liver, and skin; and thus the impure state of the blood influences the manifestations of the nervous centres. In such circumstances, the restoration of these functions by suitable hygeienic and medical treatment is always a principal indication of cure.

421. The chances of recovery from melancholia may be almost said to be great in proportion to the manifestation of disorder in the organs of digestion. As the pathological causes of the mental affection show themselves the more evidently, the greater hopes may be entertained of the disappearance of the latter with the removal of the former. Where these exist, the therapeutical intentions should be directed accordingly. If the function of any organ be impaired or interrupted, the restoration of it is indicated; — if the hæmorrhoidal or catamenial evacuation is suppressed, means should be taken to re-establish it; — if a cutaneous eruption have disappeared, or an accustomed ulceration or issue ceased to discharge, the skin should be acted upon, or some analogous mode of derivation and counter-irritation be adopted. It is, however, not always, nor even frequently, that melancholia can be referred to these, or equally manifest sources, and where such very obvious indications of cure as these present themselves. Still, there are generally to be observed certain conditions of the abdominal organs, of the cerebral and general circulation, and of the nervous system, which severally require attention, and furnish the basis of a rational method of treatment.

422. Where the functions of the digestive organs are sluggish, the bile is morbid, dark, irritating, or scanty, and the various secretions and excretions insufficient for the due purification of the blood, or for the preservation of it in a healthy condition, it is clearly indicated to restore these functions by means which shall impart a new impetus to the vital endowment of their respective organs, and enable them regularly to perform their offices. In a very large proportion of cases, not only is the bile morbid, but the whole abdominal secretions are disordered; and certain of them are retained on the intestinal mucous surfaces, or even accumulated in the cæcum and colon. The frequency of these changes, and the benefit resulting from the more certain means of removing them, induced the ancients to have recourse to black hellebore; and the moderns to milder cathartics, to purgatives, or to laxatives, in the treatment of this malady; and the propriety of the practice, when the means are well selected and combined, and judiciously managed, cannot be disputed. In some cases, — especially where there is much torpor of the biliary apparatus and of the bowels, with accumulated sordes on the digestive mucous surface, — a brisk *emetic*, or even an *emeto-cathartic*, is of great service early in the complaint, and at the commencement of the treatment. When the strength of the patient will permit, a continued action on the bowels — an artificial diarrhœa — should be kept up, by means of chologogue or stomachic purgatives or aperients, for a considerable period; and purgative enemata may also be employed. A combination of the compound infusions of gentian and senna, with a neutral salt, and an aromatic spirit or tincture (F. 266.), will be appropriate in these cases; and the spirit of turpentine, with castor or olive oil, may be prescribed in enemata. A similar means to these, of which a variety will be found in the *Appendix*, and in the articles Hypochondriasis and Indigestion, may be employed according to the peculiarities of individual cases. When the patient believes that his physical health is not in fault, or when there is a disposition to sanguineous determination to the head, James's powder, or tartarised antimony, may be given in small and frequently repeated doses, so as to keep up an action upon the skin or bowels, and to induce a feeling of bodily ailment, so as to dispose the patient to pursue a suitable treatment.

423. When indications of congestion of the brain, or of determination of blood to this part, or of general vascular plethora, or of inflammatory irritation of the gastro-intestinal mucous surface, or of fulness of the portal system, are observable, — and especially if they have become more evident after the disappearance of an accustomed evacuation, — general or local bloodletting should not be delayed. Local depletions are generally most appropriate in these circumstances, and ought to be decidedly employed — particularly in the more robust. Aretæus permitted bloodletting only in the young and robust, in this complaint, and in small quantity, and chiefly in spring; Cullen considered that it was rarely useful; Pinel seldom employed it; and Esquirol advised it in nearly the same circumstances as I have recommended it. The application of leeches, and even the repetition of them, to the vicinity of the vulva, or around the anus, when the catamenial or hæmorrhoidal evacuations have been interrupted, or the portal system congested; and to the epigastrium or hypochondria, or behind the ears, when uneasy sensations are referred to the enclosed organs, — is generally attended with benefit; and this evacuation may be repeated even oftener than once, and commonly with advantage, although it may be requisite to administer tonics, antispasmodics, or restoratives, at the same time.

424. Many cases of melancholia present a morbid susceptibility and sensibility of the nervous system. The patient is remarkably nervous; and his distress is evidently heightened by sanguineous depletions, however moderate; and by purgatives, if too frequently exhibited, or even if they operate beyond the mere evacuation of the bowels. Lorry has well described this form of melancholy; and very properly recommended for it calming measures, — opiates, with gentle stimulants and restoratives. In these cases, the warm or vapour bath, the tepid or warm douche, the affusion of warm or tepid water on the head, and the tepid bath, according to circumstances, will be of great service. Small doses of camphor, with opium, morphia, or hyoscyamus, or with the extract of poppy or lactucarium; the infusion or the ammoniated tincture of valerian, or both conjoined; the infusion or tincture of hop; and other antispasmodics and diffusive stimulants, va-

riously conjoined with sedatives, narcotics, &c., and a pure dry air, change of scene, and light food, — are generally beneficial in this state of disorder. If there be watchfulness and irritability, the hop-pillow, or the syrup of poppies, or the compound tincture of camphor, in a small enema, will afford relief. When the disorder has been caused by masturbation, the cold affusion or shower bath, the cold plunge bath, and tonics, — especially the muriated tincture of iron, — should be prescribed. As the energy of the nervous system returns, more permanent and energetic restoratives and tonics may be employed; but, during their use, the secretions and excretions ought to be carefully promoted, and the bowels kept freely open; care being taken to prevent congestions of the brain or portal system.

425. In many instances, a combination of the several indications based upon the conditions of the abdominal organs and of the vascular and nervous systems, and the association of more or less of the means required to fulfil these indications, are often both necessary and successful. Thus, it is frequently of the greatest advantage to act energetically upon the bowels by means of stomachic or chologogue purgatives; to deplete the vascular system, either generally or locally; and, at the same time, to give stimulants, antispasmodics, and tonics; the choice of the several means depending upon the characters and symptoms of individual cases. As to the propriety of exhibiting the more active tonics in melancholia, much doubt may be entertained: but if accumulations of morbid matters in the bowels have been removed; if the tongue be clean, moist, or watery; if the secretions and excretions have been improved; and if a trial of them be not productive of headach, of increased heat of the scalp, or of feverishness, — the use of them may be persisted in; care being taken to keep the bowels freely open, and to guard against local fulness or determination of blood. — The diet, regimen, and the management of convalescence, require no remarks beyond those which have already been made (§ 402—405.).

426. *c. Demonomania*, in its different forms, and especially *theomania*, or various states of religious insanity (§ 121.[f] *et seq.*), require a somewhat similar plan of treatment, and the same indications of cure, as have been recommended for melancholia, with which they are more or less closely allied. Moral treatment is particularly necessary; but, equally with the physical, should be varied according to the peculiar features of individual cases. In all the modifications of religious insanity, the consolations of religion, administered by sincere, moderate, and rational ministers of it, are of the greatest service. I have witnessed this in several cases; and, when judicious moral and religious management is aided by a sound physical treatment, recovery will take place in the great majority of instances. In no form of insanity is greater care requisite than in this, to protect the unfortunate patient, and his near relatives, or members of his family, from his insane impulses to commit suicide or murder. PINEL states, that a person, after listening to an alarming sermon, considered himself as irretrievably lost, and murdered all his children, in order that they might not experience eternal damnation. ESQUIROL mentions the case of a woman, who entertained a similar idea, and attempted the lives of her children to preserve them from punishment in a future world; and numerous other instances of the same kind might be adduced. When persons thus disordered succeed in their horrible design, they rarely recover; for no sooner is reason restored, than the distress experienced by them, when reflecting upon the act they have committed, occasions a return of the malady.

427. The physical disorder, both antecedent to, and coëtaneous with, the mental disorder, should be carefully investigated; and particular attention devoted to the states of the brain, of the digestive organs, and of the uterine functions; and determination of blood to the head prevented by local depletions, the shower bath, or douche; by derivatives, and aperients. In the more robust and young, the preparations of antimony, in small doses, and occasionally in larger quantity so as to produce vomiting, are often of service.

428. In those cases, where the patient entertains the belief that he is changed into some animal, — or that he has changed his sex, — or that he has lost a portion of his body, — or that he carries about with him a living thing, or some strange substance in his abdomen, — or that some singular matter is substituted for one of his organs or members, and acts from this impression, — the success of treatment is often not great. In many of these, there is reason to suspect physical disorder, if not structural disease, in the organ or part to which the insane delusion is referred; and to that organ the investigation and the treatment should be especially directed.

429. *B.* TREATMENT of GENERAL INSANITY. — *a.* OF MANIA. — In treating mania, it is necessary to have a most intimate regard to the stage of the disease, — to the degree of general and cerebral vascular action, and vascular fulness, — and to the state of the secretions and excretions. The means which will prove most beneficial during the acute stage, and especially in the early part of it, will be inappropriate, or even injurious, in the chronic period, of the malady. — The treatment of mania is both *hygeienic* and *pharmaceutical.* The former comprises various moral, intellectual, and physical means: the latter, the internal remedies intended to subdue morbid action, and to restore the healthy functions. — *a.* At the commencement, and during the early or *acute stage*, of the malady, the patient should be placed in a large, darkened, and well-ventilated apartment, the air of which should be fresh and cool. Unless his violence is extreme, he ought to be allowed the full range of that, or even of an adjoining apartment, in the watchful care of sufficient attendants; and the restraint even of the strait waistcoat should be dispensed with, unless urgently required. Complete *seclusion* is most necessary, and it should be preferably conducted, in a large institution, conformably with what has already been advanced on this subject (§ 391.). All means of irritation or excitement should be prevented, as far as may be compatible with safety to the patient and those around him. The visits of relatives, connections, or even of acquaintances, should be prevented; and the patient ought to be exposed to the smallest possible number of impressions and causes of excitement. The diet should be rigidly antiphlogistic; and cooling diaphoretics, refrigerants, and diluents prescribed. The nitrate of potash,

the muriate of ammonia, the solution of the acetate of ammonia, the spirits of nitric æther, the solution of tartarised antimony, camphor julep, &c., may be severally used as refrigerant diaphoretics, or administered in the patient's usual drink; or any of the articles prescribed in the *Appendix* (F. 588. *et seq.*) may be employed with this intention.

430. In this form of insanity, patients ought neither to be retained in their own houses, nor confined to their beds. If they are turbulent, vociferous, and violent, their extravagance should be allowed to exhaust itself, without being perpetuated by the excitement of contradiction, irritating coercion, or violence — unless in as far as coercion is indispensable; and, as soon as it shall have served its purpose, it should be relaxed. Soothing means, with firmness, and decision when circumstances require it, should always be tried, and never departed from, even when the utmost restraint is also imposed. The perceptions of the maniac are seldom so entirely obscured as to render him incapable of understanding kind and soothing treatment, or to make him altogether insensible of considerate modes of having recourse to coercion. This has been proved by the able management of cases of this malady in the County Asylum, by Dr. CONOLLY. M. ESQUIROL also observed that coercive means should not be resorted to until the maniac risks his own life, or the lives of others; and even then they should be temporary, and be laid aside as soon as a calm takes place. When the patient will not pass the night in bed, it is better to leave him unrestrained than to coerce him, if he evince no mischievous tendency. This writer has found that the more that liberty has been granted to maniacs, without compromising their safety, the fewer have been the instances of furious mania, and the more rare the instances of the supervention of apoplexy and paralysis, — complications not infrequently produced by the irritation and excitement caused or perpetuated by unnecessary or prolonged restraint, or by restraint imposed in a harsh unfeeling manner. — The *moral treatment* should be conducted conformably with the principles which will be stated hereafter.

431. The *diet* may be more liberal as the disease passes from the acute to the more chronic stage; but in all periods, hunger or thirst, if not appeased, augment the irritation and violence of the patient. The food should be of the most digestible, and least exciting, kind. In some cases, at the commencement of the attack, all food is refused; but this repugnance wears off in a few days. Coercion, in such instances, is unnecessary, as the dislike arises either from gastric disorder, or from excessive cerebral excitement; and, in both circumstances, abstinence is a necessary part of the treatment. At a more advanced period, the farinaceous and leguminous articles of diet, warm milk with bread, rice and milk, ripe and seasonable fruits, and the white meats, are the most appropriate. The *drink* should always be cooling, and febrifuge, as already advised (§ 429.).

432. *β.* The *strictly medical treatment* requires the calmest consideration: the spirit of system, and an irrational method of routine, should be altogether banished; the means of cure should be appropriate to the peculiarities of each case at the time of prescribing for it. The exact pathological or physical conditions should be ascertained as correctly as possible, and remedies prescribed accordingly; and with due reference to the age, habit of body, temperament, modes of living, and occupations of the patient, — to the predisposing and exciting causes, — to the season, — and to the stage and previous character of the disease. — At the commencement of the attack, and if gastric disorder is manifest, one, or even two, *emetics* of tartarised antimony, dissolved in barley water, or in any other diluent, should be exhibited; but if there exist general plethora, as well as inordinate vascular action in the head, a full *bloodletting* should precede the emetic. After the operation of this latter, increased action should be moderated by the continued exhibition of the solution of antimony with liquor ammoniæ acetatis. It is sometimes requisite to repeat the bloodletting, — especially if redness of the face or eyes, noises in the ears, a pulsating pain in the temples, or increased heat of the scalp, or augmented action of the carotids, still continue. When the first bloodletting has been copious, a local depletion may be sufficient, — as *cupping* behind the ears, or in the nape; or the application of *leeches* to the temples, or around the base of the head, or even to the anus. Great care is requisite not to bleed too much; for if maniacs be too much reduced by sanguineous depletions, they are apt to lapse into dementia or imbecility.

433. After the operation of the emetic, a full dose of *calomel*, either alone, or with *James's powder*, may be given, and its operation promoted by some active *purgative* taken a few hours afterwards, — and preferably, according to my experience, by half an ounce, or six drachms, each of castor oil and spirits of turpentine, in any suitable vehicle. If the action of these be tardy or insufficient, it may be promoted by the same or other active cathartics prescribed in enemata. If the cerebral excitement continue after these, or return, the *warm* or *tepid bath*, or a bath of an intermediate temperature, may be used, — the patient remaining in it for a considerable time; *cold lotions* being applied to the head, or cold water being affused upon it. The bath may be resorted to, in this manner, every time that the delirium becomes violent. The bowels should be kept freely open during the attack; and the cooling *diaphoretics* already noticed, with *diuretics*, should be taken every four or five hours, — particularly the solutions of the acetate of ammonia and of tartarised antimony with the spirits of nitric æther. The patient's head ought to be kept cool, by the usual means; and, if the heat be at any time considerable, the *ice-cap*, or the *cold affusion*, may be used.

434. When the violence of the symptoms is abated, the patient may be allowed more liberty, and permitted to enjoy the open air, where he may give vent to his excitement, which will the sooner pass off by being unrestrained. The *diet*, which was heretofore extremely restricted, may be more liberal; and, if intervals of reason occur, the utmost kindness and interest should be manifested for the patient; the *moral treatment* coming in aid of the *physical* and *medical* during the whole course of the malady. If critical evacuations are manifested, they should be promoted by a more nutritious regimen, by gentle tonics, or by means appropriate to the crisis that may appear.

435. The treatment is no longer rational, if all the periods and all the modifications of the disease are treated in the same manner. If mania have occurred after the suppression of an accustomed sanguineous discharge, early bloodletting, and subsequently *local depletions*, repeated at intervals, and in situations having reference to the accustomed evacuation, are indispensable. If it have appeared after delivery, or upon the suppression of the lochia, or of the milk, *purgatives, blisters, derivatives* and *revulsants, setons*, or *issues*, &c. are necessary. If it have followed some acute disease, upon too rapid growth, or on masturbation, the warm bath, with cold applications to the head; a nutritious and *milk diet;* the use of *asses' milk, tonics, cinchona*, or *quinine*, with acids; the cold *shower bath*, or *salt water bathing*, — will be most useful. But in all cases, — and especially when the mental disorder has supervened upon the disappearance of some cutaneous eruption, or of gout or rheumatism, — aperients, purgatives, blisters applied to the nape and kept open, or setons there, or other permanent irritants of the skin, will be found of service.

436. When mania appears in persons of a highly nervous temperament, it is generally independent of vascular fulness, or sometimes is even owing to a deficiency of blood, a larger proportion being determined to the brain than to the rest of the body. In this case, the *cold affusion* on the head, while the lower part of the body is immersed in a warm bath, or the *shower bath*, the patient standing in a pan of warm water, is generally beneficial. If the disease be attended by irritation of the reproductive organs, *tepid baths, cold enemata*, and the internal use of the *acetate of lead* with *hyoscyamus*, or of *ipecacuanha* with *opiates*, or *camphor* with *vinegar*, will be of service. In most cases characterised by nervous symptoms chiefly, the infusion and other preparations of *valerian*, small doses of camphor or of assafœtida, and *prussic acid* or *laurel water*, will be of use, when cautiously administered. In these especially, the cold *douche*, or affusion on the head, has both a physical and a moral effect in calming the patient.

437. If the disease resist these means rationally and appropriately employed, other remedies, of a more perturbating or empirical kind, may be tried; but these require the utmost caution, and their effects must be carefully watched. In strong, young, plethoric, and well-fed persons, bloodletting, generally or locally, may be repeated. When the propriety of venæsection is doubtful, small and repeated local depletions should be adopted, and those which may have a derivative effect ought to be preferred, — as four, five, or six leeches applied to the anus, and repeated every ten or fourteen days, according to the strength of the patient. The *semicupium*, cold applications to the head, and *purgatives* with colocynth or aloes, will also be required; and if these occasion an hæmorrhoidal affection, the circumstance may have a favourable influence on the mental disorder.

438. *Drastic purgatives* are often of service, and particularly in the more obstinate states of mania. They frequently bring away brown, greenish, tenacious, and otherwise morbid secretions, which had been long adhering to the intestinal mucous surface, or lodged in the cells of the colon and in the cæcum; and which had either predisposed to, or perpetuated, the mental disorder. In some instances, a prolonged course of purgatives is required fully to evacuate these accumulations; but, when this is necessary, the patient's strength should be prevented from sinking, by a fuller diet and a more restorative regimen than would otherwise be requisite. It is often difficult to administer these medicines so frequently, or in such quantity, as may be necessary, as maniacs are frequently persuaded that they are given to poison them; but such substances as may be taken in their food, — as calomel, croton oil, elaterium, &c., — may be employed. *Croton oil* may also be rubbed over the abdomen, and cathartic enemata liberally administered. In cases of this kind, the croton oil may be prescribed in small doses, with the extract of colocynth, or the compound camboge pill; and, when the patient has no reluctance to medicine, the compound infusions of gentian and senna, with the sulphate of potash and some purgative and carminative tincture; or a draught containing equal parts of castor oil and spirits of turpentine, may be preferred. If the purgatives occasion any increase of irritation, or are sluggish in their action, the warm or tepid bath will be found of great service.

439. When the integuments of the head appear engorged with blood, — and when, in the advanced course of the disease, or in its chronic state, the head or scalp seems congested, — small and repeated *cuppings*, behind the ears, or on the shaved scalp of the occiput, will often be serviceable; or *free incisions* may be made in this latter situation, as advised by Dr. Prichard, and kept open by lint, or by peas, in the manner of a common issue. In chronic cases, *moxas* and the *actual cautery*, applied to the occiput and to the nape, have been recommended by many Continental physicians; but the other measures just named, or setons or issues in these situations, are equally efficacious.

440. The propriety of exhibiting *opium* in mania has been much doubted. But, when sanguineous depletions have been duly prescribed, and morbid accumulations in the bowels freely and entirely evacuated, — if the scalp be neither remarkably hot, nor congested with blood, and if there be great restlessness, irritability, and want of sleep, — the maniacal excitement being the result rather of nervous disorder, than of vascular action, — the judicious exhibition of opium, or of *morphia*, — especially in conjunction with other appropriate medicines, — will often be productive of the greatest benefit. The opium, or the morphia, however, should be given in a full or very large dose; and, according to the peculiarities of the case, it may be conjoined with *camphor*, or *digitalis*, or *James's powder*, or *ipecacuanha*, or calomel, or with an alkaline carbonate, or with aromatics. There can be no doubt of the benefit which camphor may produce in this state of mania, although this also has been disputed. Those who possess weak powers of discrimination, whose knowledge of morbid actions, and of the operation of remedies, is deficient or limited, will frequently fail in obtaining the usual advantages from medicines, and will hence parade their scepticism as a mask for their ignorance; but *camphor* is a valuable remedy in the circumstances of the

disease now under consideration, — yet it requires caution; and, when conjoined with nitre, and given in small doses, in the more doubtful cases, or where heat of the scalp is still present, — or when prescribed with hyoscyamus, opium, or digitalis, or with vinegar, and in larger doses, in the chronic states, and after evacuations have been energetically employed, and exhaustion is about to supervene, — it generally is productive of the greatest benefit. If the premature or inappropriate use of it should increase the restlessness, or heat of the scalp, cold applications to the head, and diluents with vinegar internally, will soon remove all disorder, or even develope its good effects. — *Vinegar* was much praised by ARETÆUS, LOCHER, and others, in this malady; but CHIARUGGI advised it to be given with camphor. One drachm of the latter may be dissolved in about two ounces of distilled vinegar, and from an eighth to a fourth part of the solution may be taken in any suitable vehicle, every four, five, six, or eight hours. — *Digitalis* has been recommended by Dr. LOCHER of Vienna, and by several British physicians, in this and similar states of mania; and when exhibited in full, or even large doses, it sometimes is of great service: but its effects require most careful watching, — especially when employed in the way most likely to prove beneficial. — The *surprise bath*, or sudden immersion in the sea, or in a cold bath, as advised by VAN HELMONT and others, as well as the *rotatory machine* of DARWIN, although recommended by some writers, are dangerous and highly empirical modes of treatment, which are now justly abandoned.

441. *γ*. When mania assumes an *intermittent form*, the same principles of treatment as have now been advocated should be followed during each attack; and, when an intermission takes place, means should be used to prevent the accession of a paroxysm. — *Cinchona* and *sulphate of quinia* have been employed with this latter intention. Where vascular fulness and increased action, generally and locally, have been removed, and morbid secretions and fæcal accumulations have been entirely evacuated from the biliary organs and intestinal canal, the sulphate of quinine, conjoined with camphor, and with as much of the purified extract of aloes as will promote a free action of the bowels, and occasionally also with hyoscyamus, will prove useful during the intervals, if neither heat of scalp, headach, nor want of sleep, follow the use of it. My opportunities of resorting to this combination of means, in this particular state of disorder, have been few; but I have found the following of service: —

No. 270. ℞ Quinæ Disulphatis, Camphoræ rasæ et subactæ, āā ʒss.; Extr. Aloës purif. ʒss. ad ℈ ijss.; Extr. Hyoscyami ʒj.; Syrupi Simp. q. s. M. Fiant, secundum artem, Pilulæ L., quarum capiat duas vel tres, bis terve in die.

442. When the patient has become calm, and begins to recognise his position and state, although some delusion or delirious excitement may remain or recur, or the moral affections may not be altogether restored, it will generally be proper to remove him from the place to which he had been confined, and to surround him with novel objects, by which he may be amused, or his mind more agreeably engaged, and where he may enjoy the advantages of air and exercise. In this stage of the disorder, a more nourishing and strengthening diet and regimen may be permitted. But, at all periods, the strictest attention should be paid to the secretions and excretions, as well as to calm the mental irritation, and to diminish the number of impressions and causes of excitement by which this irritation is perpetuated.

443. *δ*. *The convalescence* of maniacs is often prolonged and difficult; sometimes it is rapid. Some patients, when restored to their friends, to society, and to their natural habits, do not recover a complete state of health until many months have elapsed. These, especially, manifest great susceptibility and sensibility: they are readily vexed or irritated, are ashamed of their former condition, and often entertain fears at meeting with former friends. Some entertain a dislike, or a hostile feeling, to friends or persons who interested themselves in their behalf during their illness. Where this is evinced, the probability of a relapse, or of an attack of melancholia, or of an attempt at suicide, is great. Convalescents are generally very greatly benefited by travelling for some time, or by a sojourn in the country, or in some suitable place, before they are restored to their families, and are brought in intimate communication with their relatives and friends, or with those who were witnesses of their malady.

444. *b*. TREATMENT OF DEMENTIA AND FATUITY. — The various states of dementia and fatuity generally present little hopes of success from either hygeienic, moral, or medical treatment. — *a*. That variety, which M. ESQUIROL has denominated *Acute Dementia* (§ 152.), is, however, very generally remedied by a restorative method of cure, — by walking and *horse exercise*, — by the *shower bath*, followed by frictions of the surface, — by light and nutritious diet, — by *stomachic aperients*, and attention to the secretions and excretions generally, — and by the exhibition of *antispasmodics* and *tonics* — especially valerian, musk, cinchona, ammonia, camphor, sulphate of quinine, &c., combined according to circumstances. The sulphate of quinine, conjoined with camphor, hyoscyamus, and as much aloes as may preserve the bowels gently open, is often of great service in these cases. The preparations of valerian with ammonia are also most useful. When evacuations have been suppressed, or eruptions have disappeared, these should be recalled, or others substituted in their place.

445. *β*. The *chronic* or *confirmed forms of dementia* and *fatuity* (§ 152. *et seq.*) require a *diet* and *regimen* suited to the peculiarities and circumstances of each case, and to the amount of exercise which is allowed, or the patient is capable of taking. In addition to strict attention to the states of the secretions and excretions, the *shower* or *cold bath*, or sea-bathing, followed by frictions of the surface; *blisters* applied behind the ears, or to the nape, and either frequently repeated, or kept open; *setons* or *issues* in the same situation; *moxas* applied to the occiput; *incisions* of the scalp, or the production of pustules on the shaved scalp by means of the *tartarised antimonial ointment*, — are the chief remedial means. In many cases, these should be conjoined with the restorative treatment just advised (§ 444.). In a very few instances, the occurrence of an attack of acute mania has had a critical effect. — In all cases, country air, moderate exercise, and such occupa-

tions as the incoherent, imbecile, or overthrown state of the mental powers will admit of being attempted, will prove of service — at least, as respects the patient's bodily health.

446. *C.* THE TREATMENT OF COMPLICATED INSANITY (§ 162. *et seq.*) is the most hopeless — especially when any of the forms of dementia are associated with *general paralysis.* — *a.* The means which have been just enumerated (§ 445.), are usually required in this complication; and care should be taken to prevent the bowels from becoming too *constipated* on the one hand, or too much *relaxed* on the other. In either case, inflammation, rapidly passing into sphacelation, generally results. In some instances, the removal, by mechanical means, of hardened fæces from the rectum becomes necessary when the constipation has been prolonged. — *Retention of urine* is an equally frequent and dangerous occurrence in the paralytic form of imbecility and incoherency, and requires a frequent recourse to the catheter. — *Incontinence of urine*, or a frequent dribbling, owing to over-distension of the bladder, is also a common symptom. In this latter case especially, care should be taken to keep the patient dry and clean, — as unconscious or involuntary discharges of either the urine or fæces, soon occasion gangrenous sores of the sacrum, or adjoining parts, in this class of patients. Care is also requisite to preserve them from falls, and from injury from fire.

447. *b. The complication of insanity with epilepsy or convulsions* (§ 174.) does not admit of any precise mode of treatment. The means should vary remarkably, or even be opposite, according to the form of the mental disorder, and to the evidence furnished by particular cases of the existence of general or local fulness of blood, or of increased action, or of organic lesion of the brain. When the convulsive paroxysm occurs *in the course of mania or monomania*, or is in any other way associated with either, general or local plethora, or increased vascular action, or even both, is generally present, and requires sanguineous depletions, the cold affusion or douche, derivatives, cathartics, low diet, and permanent revulsants, or counter-irritants. The principles of treatment stated in the article EPILEPSY, and those advised for *mania* (§ 432. *et seq.*), are usually appropriate in these cases: the application of the means to individual instances must depend upon the discrimination and judgment of the physician. When the paroxysm is connected with *demency* or *imbecility*, or *melancholia*, an irregular distribution or congestion of blood, or organic lesion of the brain or of its membranes, or even a deficiency of blood, may exist, and require the internal and external means already recommended for dementia (§ 444.), with many of those prescribed for the cerebral form of EPILEPSY (§ 61. *et seq.*).

448. *c. Apoplectic seizures* occurring in any form of insanity, should be treated according to pathological principles. If they take place early in *mania*, or in its acute state, general or local depletions, or both, and the other means already advised in *apoplexy*, as well as in acute mania, are generally requisite. But, when seizures of this kind, or resembling it, appear in the course of *demency* or *fatuity*, a want of vital power in the brain, with or without local or general deficiency of blood, or inanition, and, in some instances, with some degree of congestion, is most probable, and sanguineous depletions are then injurious; advantage being often derived from restoratives, when these can be administered, from blisters on the scalp, and from enemata containing assafœtida, camphor, &c. — The *coma* or *lethargy*, and the *vertigo*, often associated with incoherency and imbecility, require the same principles of treatment as now advised, in conjunction with the means recommended for dementia and fatuity.

449. *d. The other complications of insanity* (§ 181. *et seq.*) require but little remark. When the associated visceral disease is of such a kind as to perpetuate the mental disorder, — especially when the *digestive* and *reproductive organs* are deranged, — the removal of such disease becomes an important indication of cure requiring instant adoption; but the means which should be adopted for its removal must vary, or even be different, in different cases. No general principle can be stated, that can apply to all. The secretions and excretions, however, should be promoted; and the processes of assimilation and defæcation — of supply and waste — duly regulated, according to the wants of the economy, and the physical exertions of the patient.

450. iii. OF THE REMEDIES USED IN THE TREATMENT OF INSANITY. — My remarks on this head will be as brief as compatible with the due consideration of some points, respecting which the opinions of the most experienced writers on insanity are greatly at variance, and which could not be so appropriately discussed as in this place. And at the same time that I thus consider the different or opposite views entertained as to the efficacy of certain remedies, I shall also notice other medicines, which have been employed in some states of mental disorder, but to which I have, yet, either not sufficiently, or not at all, directed attention.

451. *A. Bleeding.* — *a.* Great difference of opinion exists as to the propriety of *general bloodletting* in insanity. Dr. CULLEN advised it in the early stage, especially where there are fulness and frequency of pulse, and marks of increased impetus in the vessels of the head; but he admitted that, when the disease has subsisted for some time, he has seldom found it of service. Dr. RUSH carried this treatment further than any other writer of eminence; and urged numerous arguments in support of it, some of which are deserving of attention. He advised large bloodlettings, in the standing or sitting posture, early in mania; and, if the patient bore the depletion without syncope, he directed from twenty to forty ounces of blood to be taken. He was of opinion that this evacuation ought to be carried further in madness, than in any other acute disease whatever; and recommended it to be followed by local depletions, by low diet and refrigerant medicines, by cold applied to the head, and by tepid or warm baths. WEBER, BRÜCKMANN, and J. FRANK carried bloodletting nearly as far as Dr. RUSH. Dr. HASLAM is also favourable to a decided recourse to vascular depletion in madness, though he does not advise it nearly to the extent directed by Dr. RUSH and Dr. J. FRANK; and he considers it equally beneficial in melancholia as in mania. He, however, judiciously limits it

to recent cases and plethoric habits, and prefers cupping on the scalp to venæsection; the quantity of blood to be taken, varying from eight to sixteen ounces, and the operation being repeated as circumstances may require.

452. On the other hand, Pinel considered the signs of vascular action in the head, and of determination of blood thither, as very deceptive; and that bleeding, even in maniacal cases, accompanied by symptoms supposed to indicate plethora and determination to the head, tends to retard recovery, and to render it more doubtful, and to cause mania to degenerate into dementia. M. Esquirol coincides with Pinel in believing madness to be sometimes changed for the worse by bleeding. He has seen it increased even after an abundant flow of the catamenia; and has observed melancholia pass into furious mania after venæsection. He, however, approves of moderate bloodletting in plethoric cases, and when some accustomed sanguineous evacuation has been suppressed. Dr. Burrows has stated, that, following example rather than experience, he tried bloodletting for several years; but discovering his error, he became more cautious, and ordered venæsection scarcely in six cases of simple mania or melancholia in as many years; and that, since he changed his practice, more patients have recovered, and the cases have been less tedious and intractable. Nevertheless, Dr. Burrows, as well as others who condemn general bloodletting even in mania or melancholia, is favourable to local bleedings,—which, he believes, can seldom be dispensed with in recent cases. M. Guislain observes, that most of the cases admitted in the institutions for the insane in Belgium, have been treated by bloodletting before their admission; but that, with few exceptions, the disorder has been aggravated by the practice. He, however, admits the propriety of this measure in the circumstances in which I have advised it in the foregoing section. Dr. Seymour states, as the results of his inquiries of Messrs. Beverley and Phillips, the medical attendants in the Asylum on Bethnal Green, which receives about 400 patients, that the number of those admitted with vascular excitement, requiring bloodletting, are very few indeed; and that the lancet is very seldom used in cases of excitement, if there be no evident effect upon the brain from increased arterial action, so as to induce the fear of approaching apoplexy or paralysis. The reason they assign for not resorting to bloodletting, is, that, having done so in several instances, the result was very unfavourable. The patients were reduced from the loss of blood, and the excitement was not abated: the tongue became typhoid, and the patient sank into a state of collapse, and died. Dr. F. Willis also condemns both general and local depletions: and Dr. Prichard states, on the authority of Mr. Hitch, that Dr. Shute has proscribed the use of the lancet, leeches, cupping-glasses, blisters, drastic purgatives, and the practice of shaving the head, at the Gloucester Lunatic Asylum; and yet, that the proportion of recoveries in this hospital is very large, and that no cases of sudden apoplexy or hemiplegia have happened. Before this practice, however, can be correctly estimated in respect of the treatment of insanity generally, the circumstances connected with the cases for which it was employed should be detailed; and it should be remembered, that a very large proportion of cases sent to lunatic asylums has undergone a more or less active treatment before their admission into these institutions.

453. *b. Local bloodlettings* have been more generally adopted in the treatment of insanity, than venæsection; and they admit of less marked difference of opinion as to the propriety of resorting to them, — many of those who object to the latter, adopting the former. Nevertheless, even local depletions require caution, and are most appropriate in recent cases of mania, and of melancholia. The latter form of disorder requires this mode of depletion almost as frequently as mania, although not generally to the same extent. — The situation of local bleeding is often of importance; and I believe that the occiput, or the spaces behind both ears, and the nape of the neck, should be preferred. The circumstances indicating the amount of depletion, and the frequency of its repetition, are the same as those which show the propriety of the practice on its first adoption. The discrimination and judgment of the physician must guide him in these particulars; but the presence or absence of certain symptoms, about to be noticed (§ 460.), will generally guide his decision.

454. *c. As to vascular depletions*, however practised, no general rules can be assigned. Each case of insanity presents a distinct subject of study as to this practice; and a correct judgment can be formed only after taking into consideration a number of circumstances connected with the age, previous health, nutrition, and occupations of the patient; with the causes of the malady, and with the states of vascular action and vital power. Amongst the more recent writers on insanity, M. Foville, M. Esquirol, and Dr. Prichard have formed the most correct views as to the propriety of vascular depletions in this malady. According to my limited experience, however, the first and last of these writers may be considered as somewhat too partial to the practice; whilst M. Esquirol may be viewed as placing rather too little dependence upon it. Estimates formed respecting it, from the results obtained in public institutions, cannot always be depended upon, unless all the circumstances were known connected with the great majority of patients admitted into them — with the particular classes of patients that they commonly receive; for, in some public, or even private, asylums, many patients are admitted, who have not received benefit from vascular depletion, or for whom it has been injudiciously employed; whilst those for whom it has been properly prescribed, as to quantity or repetition, and who have recovered after recourse had been had to it, require not the aid of those institutions. Besides, of the numbers sent to asylums, there are comparatively few cases which are strictly recent, or in which the period of deriving benefit from vascular depletion is not already passed; and it should also be recollected, that by far the greatest number of those who are admitted into public institutions for the insane, have become deranged from those predisposing and exciting causes which exhaust physical as well as mental power, and that they are precisely the class of subjects least able to bear evacuations, or other depressing means of cure.

455. The lesions found in dissections of chronic cases, by MM. **Bayle**, **Calmeil**, **Foville**, and others, show that they are incompatible with the due exercise of an organ so delicate as the brain, and with the healthy manifestation of the mental powers. And, whether mental exertion or emotion disorder the circulation of this organ, and, consecutively, the material fabric, the integrity of which is necessary to the due performance of the mental operations; or whether the circulation, or the structure of the organ, is the first to be affected, and the mind the last to suffer; still such means as reason suggests, and experience has shown, to be most efficacious for quieting excited and disordered vascular action, generally and locally, without materially depressing or exhausting vital power, cannot safely be always, or even generally, dispensed with.

456. M. **Foville** states that, during many years of extensive practice in one of the largest lunatic institutions in France, he has had recourse to evacuations of blood, general or local, abundant or in moderation, rare or frequent, according to the strength of the patient, the state of the pulse, the redness of the eyes, the heat of the head, and the agitation and want of sleep, in the greater number of cases of recent insanity which have been placed under his care. He has preferred general bleeding, where there existed general plethora; but, in opposite circumstances, he has found leeches on the neck, the temples, or behind the ears, or cupping upon the same parts, or on the shaved scalp, to produce decided benefit. He considers local bleeding so very serviceable, as to prescribe it in addition to general bleeding, when the symptoms imperiously demand this latter evacuation; yet he never rests exclusively upon the efficacy of vascular depletion, but has recourse to other means. He adds, that he has had many cases of intermittent madness, the attacks of which had lasted three or four months, or even longer, when left to nature; but that there was not a single attack of a month's duration, since they were treated by bloodletting, and by warm baths with cold applications to the head at the same time; and that the symptoms were often dissipated in five or six days by these means. The experience and views of Dr. **Prichard** as to this point entirely agree with those of M. **Foville**. Indeed, the practice was advocated by him (*Treat. on Dis. of the Nervous System*, ch. i. Lond. 1822.), long before the treatise of M. **Foville** appeared. In estimating, however, the opinions of physicians attached to public institutions for the insane, as to the propriety or extent of vascular depletions, the sphere of their practice should not be altogether unheeded, and especially the circumstance of the patients having been treated previously to their admission, and the duration even of those which have been called recent cases. It is very obvious, that a patient who has been ill only three or four days, but during that time has been very actively treated, will not bear evacuating means on admission into an asylum; whilst another case, that would have been benefited by vascular depletions in the first few days of the malady, may be injured by them after a week or a fortnight had elapsed,—and this, and even other cases of much longer duration, are usually considered as recent. After all that can be advanced on this point, the propriety of prescribing sanguineous depletions, to whatever extent, must depend upon the pathological knowledge and discrimination of the physician; and if he possess not these qualifications in a high degree,—and unless he study and practice his profession as a whole, and as a profound and comprehensive science, and not as a trade or mechanical art, divisible into a number of separate parts, he cannot truly possess them,—he is quite incapable of rationally and judiciously treating insanity, or any other class of maladies.

457. *d*. There are numerous circumstances which should be duly considered before sanguineous depletions are prescribed for insanity. The predisposing and exciting causes, and the various concurring influences, should be ascertained and kept in view; the age, habit of body, constitution, and occupations of the patient, must be taken into account; and the duration of the distemper, and the means which have been already employed, ought to be precisely known. Next, the exact pathological conditions of the patient should be inquired into, and made the principal basis of the indications of the physical and medical treatment. If the patient be young, plethoric, or strong; if the attack has been acute and sudden; if the carotids and temporal arteries pulsate strongly; if the surface, and especially that of the head, be hot; if the face be red, or the conjunctiva injected, and the pupil contracted; if intolerance of light or of noise, want of sleep, spectral appearances, disordered sensation, and much agitation, be present;—the abstraction, from the arm, of twelve, fifteen, or eighteen ounces of blood will generally be productive of benefit, if it be practised within the first few days of the attack. If the good effect be only temporary, cupping upon the nape, or on the occiput, or behind the ears, will generally be requisite, and should be preferred to a repetition of venæsection.

458. The suppression of evacuations and of eruptions indicates, as M. **Esquirol** insists, the propriety of vascular depletion; and this is the case generally; but care should be taken in prescribing it, even in such circumstances, if the foregoing indications of its propriety are not present in some degree or number. The suppression is an important reason for having recourse to bloodletting; but it should not be the only reason by which the physician is guided in the matter. The mode, or situation, of local depletion, in such cases, should have reference to the evacuation which has been suppressed. If the catamenia or the hæmorrhoids have disappeared, previously to the attack, leeches may be applied to the highest parts of the insides of the thighs, or around the anus.—Acute mania most frequently requires vascular depletion; and next, melancholia. For the latter, venæsection is seldom necessary; cupping behind the ears, or on the occiput, or on the nape, being preferable. The practice is sometimes also requisite in some other states of partial insanity, particularly after the disappearance of an accustomed discharge or eruption. Whenever melancholia or any other form of partial insanity is attended by headach, or by a feeling of oppression or of weight in the head, by a full state of the blood-vessels, and by constipation, bloodletting is necessary. In the more doubtful cases, the application of leeches, or cupping, behind the ears, so as to abstract six, eight, or ten ounces of blood;

or even a smaller quantity, in persons of a weak constitution, is generally beneficial. The earlier in the attack that depletion can be resorted to, the more certain and permanent will be the benefit to be derived from it; and even when an attack is threatened or impending, it should be had recourse to, if the circumstances and symptoms indicating the propriety of it (§ 457.) are more or less manifest.

459. *e.* The *repetition* of vascular depletion should be guided by the same indications as point out the propriety of it in the first instance: when these continue or return, local depletion especially may be safely prescribed a second or even third time,—varying, however, the quantity, with existing symptoms, and with the effects produced by the previous evacuation, and with those observed at the time. The absence of redness or flushing of the face, or even pallor of the countenance, may not be a reason against depletion, especially if the other indications of the propriety of it are present.—When bloodletting in any mode is indicated, it should be performed in a standing, or sitting, or reclining position ; and on the first sign of an effect having been produced in the pulse by it, or of faintness, the abstraction of blood should cease.

460. *f.* It is of great importance to attend to all the *circumstances and symptoms indicating the impropriety of vascular depletion* in the treatment of this class of disorders. These are, chiefly — far advanced age, debility, exhaustion of the vital power, and the puerperal states; the operation of those predisposing and exciting causes which depress or exhaust the vital energies, the physical functions, and mental faculties; continued addiction to the vice of masturbation, or to the inordinate use of spirituous liquors, or to narcotics; insufficient nutrition previously to the attack; all indications of weakness and irritability, without power or tone; and all approximations to the state characteristic of delirium tremens, as a pale or collapsed countenance — very quick, tremulous or small, irregular, soft pulse — copious perspirations, — a terrified, fearful, and agitated state of mind —insensibility of external impressions, and tremors of the extremities. Wherever the tongue is tremulous, or the voice weak or tremulous, the hands unsteady, the pulse weak, quick, or open, and readily compressed; — or when the extremities and skin are cold, damp, or clammy; or the sweats profuse, and the tongue is covered with a dark, brown, mucous coating, — however great the maniacal or delirious excitement and agitation may be, — sanguineous depletion will then be injurious. A natural temperature, or coolness of the scalp; weak action of the carotids, and great frequency of the pulse, with swimmings or giddiness on assuming the standing or sitting position, are also strong indications of the impropriety of bloodletting.

461. *B. The abstraction of heat from the head, bathing, &c.* — The hair should be removed from the head in all acute cases; and where there are great heat of the scalp, and vascular excitement, particularly in mania, the head ought to be shaved. —*a.* For young, robust, and maniacal patients, the *shower bath*, twice or thrice a day, — or the *affusion of cold water* on the head,—is of the greatest benefit, and is recommended by CELSUS, RUSH, ESQUIROL, BURROWS, FOVILLE, PRICHARD, and many others. — When hysterical symptoms are associated with insanity, the affusion of cold water on the head is especially beneficial. Both the cold shower bath, and the cold affusion, are sometimes followed by reaction, and consequent excitement and violence, particularly in irritable temperaments. In these cases, a repetition of the treatment, and the continued application of cold to the head, by means of evaporating lotions, or the *ice-cap*, will generally be necessary. M. FOVILLE places a cap on the head containing ice, and keeps the body immersed in a warm bath for two or three hours; and repeats this practice twice or thrice in the day, according to the violence of the symptoms. At first, he found, when resorting to it only once a day, that reaction, with increased agitation, not infrequently supervened; but, on repeating the bath, and keeping the ice constantly applied to the head, the success of the treatment has been much greater. This combination of warm and tepid bathing with cold applications of various kinds to the head was, however, long previously advised by DANIEL and FOLBERG.

462. The foregoing modes of abstracting heat from the head, as well as the application of evaporating lotions, are serviceable chiefly in *recent cases*, where there are much heat of the scalp, and irritability; but they should be discontinued when the temperature is reduced to the natural standard, and repeated as soon as it rises above it. Intense cold applied to the head, in chronic states of insanity, although the patient be noisy and violent, seldom induces sleep or quiescence: it may even become a source of irritation. The temperature of the scalp should be a guide to the practice in all cases. It may be stated as a general rule, that the heads of all insane persons should be kept cool, and the hair closely cut. They should never wear any covering on the head, when within doors. The only exceptions to the rule are furnished by some cases of dementia, or partial insanity, where the low temperature of the head, and weak action of the carotids, indicate insufficent vascular action and tone in the brain: in these cases, the hair may be worn longer than in others. Insane patients should also sleep with their heads more or less raised.

463. *b.* The *tepid douche* or affusion, *tepid shower bath*, or even the *warm douche*, are severally of use, in certain states of mental disorder, especially when there are great restlessness and want of sleep. In melancholia, I have found the tepid shower bath, commencing with the water at 90°, and gradually lowering the temperature to 80°, and ultimately to 60° or 50°, of great benefit. The *warm douche*, or *affusion*, is most appropriate to delicate females, or to persons of great susceptibility and irritability, conjoined with weak action and deficient vital power; and particularly when there is prolonged watchfulness. *Warm* and *tepid bathing* are extremely serviceable in most cases of insanity, when judiciously managed and conjoined with other appropriate means. If there be great vascular action generally, as well as locally, as in recent maniacal cases, tepid bathing will then be appropriate. If the lower extremities are cold, and the general surface is either of the natural temperature, or below it, warm bathing is particularly indicated. If there are chronic eruptions on the skin, a languid circulation, sleeplessness, and irritability, the warm bath continued for a considerable

time, and frequently repeated, is especially beneficial. In many cases, increased heat of the scalp exists in connection with these states of the general surface and extremities; and for these, the addition of mustard or of salt, or both, to the warm water, whilst cold, in some form, is applied to the head, will be of great service, particularly in the more recent cases. The association of cold applications to the head, and of the *warm semicupium* or *pediluvia*, either simple or medicated, is also useful, particularly when there are much restlessness and watchfulness. — *Cold bathing*, especially salt water bathing, is sometimes of service in chronic mania, and in melancholia; but chiefly during convalescence, and when tonics, change of air, and invigorating regimen, are necessary. It has been advised by numerous writers, but it requires a careful consideration of various circumstances connected with each form of insanity, and with individual cases, before it should be carried into practice. — The *bath of surprise*, or suddenly plunging the patient into a cold bath, and keeping him immersed in it for some time, or until incipient asphyxia is produced, although recommended by Baglivi and Boerhaave, is not only an empirical, but also a dangerous practice. It has been said to have cured many, — that is, many have recovered *after* having had recourse to it; a few, probably, almost immediately; but others have experienced attacks of apoplexy, or of epilepsy, or even of palsy, in consequence of it. The cold shower bath is certainly the safest and most generally applicable mode of cold bathing, for any form of mental disorder: the temperature, as well as the quantity of water, being varied according to the circumstances of the case.

464. C. *Emetics* have been recommended by many writers, in this class of disorders, and especially by Monro, Perfect, Selig, Ranöe, J. Frank, Rush, Cox, Esquirol, and Prichard. They are more particularly indicated in melancholia. Dr. Burrows has had recourse to them, chiefly to free the stomach from troublesome ingesta, accumulated phlegm, or morbid bile; and sometimes to give activity to torpid viscera. He has found them useful, also, by interrupting intense abstractions, hallucinations, and capricious resolutions; and when urine has been retained from obstinacy. They are, however, still more beneficial, by emulging the biliary organs, by evacuating mucous sordes from the stomach, and by rousing the organic and assimilating functions. Dr. Cox states, that in every species and degree of maniacal disease, emetics have proved valuable and efficacious; and Dr. Prichard adds, that Dr. Wake, physician to the York Lunatic Asylum, has assured him, that he has found no remedies so frequently efficacious as emetics. Dr. Haslam, however, although he confirms their utility in cases attended by disorder of the stomach, declares that, after the administration of many thousand emetics, to persons who were insane, but otherwise in good health, he never saw any benefit derived from them. The experience of Esquirol, Foville, and Prichard, respecting them, agrees with my own observation: they are precluded by a plethoric habit, and cerebral congestion — at least, until these are removed. They are most likely to be of service in hypochondriacal dejection and melancholia, attended by torpor; and when the secreting functions and vital actions require to be stimulated and roused. They are also, sometimes, useful during states of furious excitement, — producing calmness, and restoration of sleep. Where there is a morbid addiction to intoxicating liquors, or a ravenous appetite, in maniacal cases, tartar emetic added to these liquors, or to the food, so as to produce either nausea or vomiting, is often of service. When there is much determination of blood to the head, and in other circumstances connected with insanity, vomiting is frequently excited by tartar emetic, or even by other substances, with great difficulty. In these cases, the *cold affusion* on the head, soon after the emetic has been taken, will often cause its operation, as well as protect the brain from the ill consequences of its operation. A combination of emetics is also of use, in these respects.

465. *D. Purgatives.* — *a.* The propriety of exhibiting cathartics or purgatives in the treatment of mental disorders is undoubted; but there are various circumstances, complications, and states of these disorders, which contra-indicate their use. There can be no hesitation in prohibiting them, when there is any indication of inflammatory action in the digestive mucous surface. This surface is often inordinately irritated, or even ulcerated in the more chronic states of insanity, and especially in dementia, imbecility, and fatuity; and where such is the case, purgatives are generally injurious. In other circumstances, purgative medicines, judiciously selected, combined, and managed, are amongst the most important means which can be prescribed in mental derangement. The chief difficulties are the selection and combination of them, appropriately to the circumstances of individual cases; and, in the ability of overcoming these difficulties, the science, ability, and success of the physician consist. Dr. Prichard remarks, that "the mildest cathartics are preferable to others in most instances, because their use can be long continued without injury to the structures on which they immediately act;" and that "the neutral salts, infusion of senna, rhubarb, jalap, castor oil, are, in the majority of cases, sufficiently powerful, and may be used daily or frequently, according to circumstances." More active purgatives than these are, however, often necessary in the early and acute stage of insanity, — and especially in melancholia, mania, and some states of partial insanity. In these, particularly, the intestinal and biliary secretions are frequently viscid and morbid; and the cells of the colon and cæcum are loaded with these and other fæcal matters. Hence a continued use of the more attenuating and solvent purgatives, and an occasional, or even frequent, recourse to the more active cathartics, aided by cathartic enemata, are necessary to the obtaining of the effects which these medicines are capable of producing on the mental disorder. Montanus was correct, when he said that half purges tire and molest the body without being of much service; — and hence the partiality of the ancients for the more drastic purgatives, as well as many of the older physicians among the moderns, in the more acute forms of insanity. Willis gave a scruple each of calomel and extract of black hellebore, with six grains of extract of jalap, in melancholia; and, although the quantities may appear great, yet it should be remembered that calomel in this dose will produce a solvent, rather than a purgative, effect, and that much of the virtues of

extracts were dissipated by the mode of preparation in those days.

466. *b.* That the virtues ascribed to *hellebore* by the ancients, in mania and melancholia, were not greatly overrated, may be inferred from the confidence reposed in it down almost to the present time, and still confided in it through Germany. Celsus gave the black hellebore in melancholia, and the white in mania: Aretæus preferred the former, and Mayerne the latter. Both species are employed on the Continent; but the black is more frequently used. Berends, Greding, Hufeland, Ploucquet, &c. prefer it to the other purgatives; and Quarin prescribes it in the form of Bacher's pills (F. 156.). Dr. Burrows, however, states that he has tried the extract of both the black and the white species, and found their operation very uncertain, and their effects, both upon the mental disorder and upon the excretions, in no way different from other purgatives or emetics. The extract of the *Gratiola officinalis* was much praised by Fischer, Lentin, Hufeland, and Schmidtmann; *aloes*, by Aretæus, and many others; and *jalap*, by Rademacher.

467. *c.* In the acute and early stages of the disease, with manifest congestion or determination of blood to the brain, I have preferred full doses of calomel with extract of colocynth and scammony, or with the compound camboge pill, given late at night, and followed in the morning occasionally by about four, five, or six drachms each of castor oil and spirits of turpentine, taken on the surface of milk, or of some aromatic water. If these do not operate copiously, an *enema*, containing about double the quantity of the oils, should be administered in the course of the day. I have found these oils the most efficacious purgatives — particularly as respects their operation on the mental disorder — in the early stages of mania. In some cases, it will be serviceable to trust to the more common purgative pills, with the addition of a little croton oil, to sharpen their action. After a time, the calomel may be omitted; but, during the acute state of disease, purgatives should be continued until the appearances of the tongue and of the evacuations improve. In many cases, — especially those attended by much vascular excitement, — the addition of tartarised antimony, or of ipecacuanha, to the purgative, will greatly promote its operation, and keep down vascular action. When it is desirable to produce both an emetic and a purgative operation, as in several states of mania, a solution of Epsom salts, or of sulphate of soda, to which tartar emetic has been added, may be taken every hour or half hour, until the effect ensues. It may afterwards be continued at longer intervals, so as to act freely on the bowels.

468. *d.* In the more chronic states of insanity, — and especially when there is much irritability or want of power, or when the tongue continues loaded and furred, but moist, — notwithstanding the frequent exhibition of purgatives, topics should be conjoined with them; and the constitutional powers ought to be supported by suitable diet and restorative medicines. In these circumstances, the compound infusions of gentian and of senna, with sulphate of potash, or sulphate of magnesia, or with tartrate of potash, and an aromatic tincture (F. 266.), or the extract of aloes with sulphate of quinine and camphor (§ 441.), will generally prove not only efficacious in their action on the bowels, but also beneficial as respects the mental disorder.

469. *e.* In respect of *purgatives*, as well as of *bleeding*, it may be observed, that, when insanity proceeds from *moral* and *depressing causes*, they are not generally beneficial, unless conjoined with tonics; and that frequent doses of calomel in such circumstances are often injurious. Purgatives, however, of a *stomachic* kind, or a combination of them with *restorative* medicines, is requisite, in order to promote the secretions and excretions.

470. *E. Mercury.*—Mercurials may be employed for mental disorders with three intentions: — 1st, to evacuate biliary and fæcal accumulations; — 2d, to improve the secretions, particularly that of the liver; — and, 3d, to produce a copious flow of saliva. — To fulfil the *first* of these intentions, calomel is extremely useful, — particularly in melancholia and in mania, — but it should be conjoined with, or followed by, other purgatives. To produce the *second* effect, any of the mercurial preparations may be employed, either alone, or with emetic tartar, digitalis, camphor, narcotics, &c. To accomplish the *third* end, calomel, blue pill, or the bichloride of mercury, may be given in any of the foregoing combinations, or alone. Mercury may also be exhibited in such a manner as to produce both a tonic and an alterative effect. With this view, small doses of the bichloride may be given in a tonic tincture or infusion; or small doses of Plummer's or the blue pill may be taken on alternate nights. The employment of mercurials to an extent likely to produce salivation, or with this intention, is of very doubtful propriety; but was recommended with this view by Willis, Rolfinck, Perfect, Smith, and others. Mercurial salivation was much praised by Rush. Dr. Prichard remarks, that it is by no means a general remedy for maniacal diseases; but in cases of torpor, with suppression, or a very scanty state, of any of the secretions, it is frequently advantageous. He adds, that mercury should be used in mild alterative doses, and discontinued as soon as the gums become slightly affected. Dr. Burrows mentions two chronic cases of melancholic insanity, in which the occurrence of salivation produced a cure. In mania, this effect is occasioned by mercury with greater difficulty than in melancholia. This writer states that he, subsequently to these cases, made many attempts to cure insanity by mercurial salivation; and that, although ptyalism was accomplished in several, yet he never succeeded, but in one case, to restore the mental functions; and this, also, was one of melancholia. Several instances of cure effected by salivation have been recorded by authors; still, I believe that mercury, exhibited to the extent necessary to produce this effect, — and especially when it fails of causing it, — is quite as likely to be as injurious as beneficial — to cause partial insanity, melancholia, and mania, to lapse into dementia or imbecility,—particularly in weak, susceptible, and irritable constitutions. We know, from numerous cases (and several have been observed by me), that the injudicious or excessive use of mercurials will sometimes occasion partial and melancholic insanity, — a circumstance which should, in some manner, influence our practice. Unfortunately, we know nothing of the symptoms, or of the modifications, of insanity, which indicate a

probable advantage from mercurial salivation. The most likely conditions are mania or melancholia consequent upon apoplexy, or complicated with hepatic disease. Mercurials, and particularly salivation, are most likely to prove injurious in every form of insanity which has been occasioned by depressing moral, or by exhausting physical, causes, — and especially by prolonged anxiety, or by masturbation. The bichloride of mercury, however, used in minute doses, as an alterative, in conjunction with tonics, is sometimes of service in several forms of mental disorder, and particularly in scrofulous constitutions.

471. *F. Soporifics.— a. Sleep, &c.*—It has been supposed that it is indispensable to procure sleep, — particularly when watchfulness is protracted; and that relief will generally follow it, when obtained. But sleep is not always much required; and is not even generally followed by relief, although it frequently is. In the early, or even incipient, states of mental disorder, topical bleeding, shaving the head, cold applied to the scalp, and purgatives, are the best means of producing repose; and others, especially narcotics, are then generally injurious: but, in more chronic cases, and where there is obvious exhaustion, consequent upon depletion and evacuations; or a state of great susceptibility and irritability, or of vascular inanition, generally, or locally as respects the brain; appropriate means of procuring sleep, and the use of narcotics, in suitable combinations, are most requisite. Various modes of producing a soporific effect, in mental disorders, have been advised, and very often with little attention to the pathological conditions for which they are severally suited. A few of these have been just mentioned; and others, especially refrigeration of the scalp, swinging, gyration, diet, certain positions of the patient's head, narcotics, &c., have been also recommended, with a view to this effect. It is often more beneficial to procure repose by other, and more indirect, means, than by narcotics; but several of these may be more dangerous than the latter, if empirically prescribed, as they too frequently have been.

472. *Swinging* seems to have been used by CELSUS and CÆLIUS AURELIANUS, to procure sleep; and its influence, in a limited form, is shown, by the rocking of a cradle, on children, and by the motion of a boat or vessel, at sea, upon both children and adults. It obviously affects the circulation, especially that of the brain; and, indirectly, both the stomach and the cutaneous circulation. *Horizontal gyration* was advised by DARWIN, and both it and *swinging* were practised by Dr. Cox, in mental disorders. Dr. HALLARAN, also, adopted both these means, in the Cork Lunatic Asylum, and coincided with Dr. Cox as to their utility. They employed two machines, or rather modifications of the rotatory machine: one, in which the patient was kept in a sitting position; the other, in which he was placed horizontally in a bed or crib. The former, or the *erect* machine, is described as seldom failing to produce copious evacuations in the most obstinate cases,—especially if, on increasing its velocity, the motion be suddenly reversed every six or eight minutes, pausing occasionally, and stopping its circulation suddenly. The effects are, an instant discharge of the contents of the stomach, bowels, and bladder, in quick succession. Should the stomach only be acted upon, a purge is recommended immediately afterwards. The *horizontal* modification of this machine, or circular bed, is employed for procuring sleep; the *erect*, for producing evacuations and moral repression. At *La Charité*, in Berlin, machines for both horizontal and perpendicular rotation were employed. VON HIRSCH recommended swinging in a hammock and various other modifications of this method have been advised.

473. Dr. BURROWS remarks, respecting these powerful means of treatment, that clear evacuation of the bowels should precede the use of either; and that they should not be employed early in the disease, until the violence of the attack has subsided; nor in young plethoric persons, nor where there is vascular determination to the head. The motions ought to be commenced gradually, till carried to the degree of velocity desired. When sleep is the object, a slow and continued action of the machine, without affecting the stomach, if possible, is necessary. When its full motion produces great prostration of strength, and lowers remarkably the circulation and animal temperature, advantage has been obtained from it. In the intermitting form of mania, it has sometimes checked the approaching paroxysm; and in the more continued cases, it has broken the catenation of morbid ideas; and the dread of being again placed upon it has often made the patient more manageable and alive to surrounding objects. Dr. PRICHARD states, that Dr. BOMPAS and Dr. DRAKE, of the Lunatic Asylum at York, have assured him that they consider the rotatory machine as a resource of great value in the treatment of madness. Although the opinions of these physicians, as well as of Dr. Cox, Dr. HALLARAN, and some others, are in favour of the use of this machine in the treatment of insanity, yet it requires so much caution, and pathological observation and experience, to avoid the most dangerous consequences * from it, as to deserve the opinion already expressed respecting it (§ 440.).

474. Want of sleep, in some chronic cases of insanity, sometimes arises from inanition, consequent upon too low diet, and the abuse of evacuating and lowering remedies. In these, as well as in those cases of recent mania, occurring in delicate and nervous constitutions, and arising from a deficiency of blood generally, and possibly also locally in regard of the brain, a full diet, and malt liquor or wine in moderation, will prove the most serviceable soporifics. TUKE, BURROWS, and others have remarked, that noisy maniacs, who hardly ever sleep, by a change from a low to a full diet, especially after a full meal before going to bed, with the addition of a moderate quantity of porter, or even with porter alone, have often slept soundly, and ultimately recovered. It has been recommended to procure sleep by causing the patient to sleep with the head low: but this is a dangerous experiment, especially where there is vascular determination to the brain; and in such cases is sure not to succeed. Indeed, sleep in the

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* Dr. HORN, of Berlin, remarks, that this powerful remedy should never be employed without great caution, and by experienced persons. Dr. BURROWS adds, that, notwithstanding his caution, a fatal accident occurred to one of his patients from its use, and created so great a popular clamour as to oblige him to retire from *La Charité*.

entirely recumbent position is seldom attended by benefit to maniacs. When, therefore, they can be persuaded to sleep in a semi-recumbent posture, it is to be preferred. The sitting position is generally better than the entirely horizontal; but, whatever may be the position, sleep will not afford relief, if the head be not kept cool by sufficiently refrigerating applications. The hop-pillow is sometimes of service, in the more nervous and irritable cases; but it is rarely of use when there is active vascular determination to the brain, — at least, not until this morbid state is removed. When much disorder of the stomach exists, alkalis and other antacids often assist in procuring repose, — especially when presented in conjunction with narcotics, and when the circumstances of the case warrant the use of these latter means. Very gentle friction of the head, prolonged combings of the hair, and gentle friction of the general surface, especially after a tepid or warm bath, have been followed by refreshing repose, in many of the nervous states of mental disorder, or in cases unattended by marked vascular excitement in the brain.

475. *G. Narcotics.* — *a. Opium and its preparations* have been prescribed in mental disorders by Cox, Odier, Brandreth, Chiarugi, Doemling, Riel, and many others; whilst a few writers reprobate the practice. There can be no doubt of opiates being of great service when appropriately employed. They are not generally admissible, and they therefore require great discrimination in prescribing them. — I have already stated the pathological conditions and the previous treatment warranting a recourse to them in mania (§ 440.); and the same remarks apply to the employment of them in melancholia. In this latter affection, however, as well as in the more purely nervous states of mania and monomania, or when these are complicated with hysteria, it is often necessary to conjoin opiates with some restorative or antispasmodic, as camphor, valerian, ammonia, æther, &c. Opiates are less frequently useful in any of the forms of dementia than in these. M. Guislain justly remarks, that in cases of high excitement, strong full pulse, heat of skin, fulness of the vessels of the head, opium is injurious. It is most serviceable in delicate and attenuated persons of feeble constitution, and in those with cold relaxed skin, and frequent, small, weak pulse. If the disease has been of some duration, — if the circulation has been daily losing its force,— if there are only nervous symptoms to combat, — there can be no hesitation in giving opium. I may add, that it is especially indicated when restlessness, or prolonged want of sleep, has continued after sufficient evacuations have been procured; and still more so, if great exhaustion, tremor, cold perspirations, fits of violent delirium, and a very rapid and small pulse, supervene.

476. Still, much of the benefit that may be derived from opium will depend upon the selection of the preparation, the dose, and the mode of combining and of exhibiting it. The *acetate* and *muriate* of *morphia* are not so likely to disorder the head subsequently, as pure opium, or the simple tincture; and Battley's solution, or the black drop, may be preferred to the latter. When, however, opium, or its tincture, is given with aromatics, consequent disorder is more rarely produced by it. Van Swieten, Darwin, Kriebel, Brandreth, Currie, and others, record cases in which remarkably large quantities of opium have been given with advantage. But these are extreme cases, which merely show what may occur, but which should not guide our practice. It will generally be preferable, when the indications for the use of opium are conclusive, to prescribe it in a full dose at once; especially if the chief object be to procure sleep. In this case, from one and a half to three grains may be prescribed; or half a grain of the acetate or the muriate of morphia. If this dose fail, it may be repeated after six or eight hours; or even a somewhat larger dose may be taken. If a third dose produce no good result, it should be laid aside. In some cases, much smaller quantities may be prescribed with advantage, — especially when debility, exhaustion, or inanition of the vascular system, is great; but, in these circumstances, the opiate should be repeated somewhat more frequently, and be combined with aromatics, restoratives, antispasmodics, or tonics, according to circumstances. Dr. Burrows states, that where an anodyne has been required, he has begun with three grains of opium, and repeated one every two or three hours, — never in this way exceeding twelve grains; and that if sleep has not then followed, he has desisted.

477. The *combination* of opiates with other remedies thus becomes a matter of no small importance; and, indeed, much of the benefit opiates afford depends upon this circumstance. Friborg advises them to be prescribed with camphor and nitre; and Perfect, in nearly a similar form. There can be no doubt of the advantage often derivable from this and similar modes of exhibiting them. Where there is much determination of blood to the head, however, the camphor, unless in very small doses, may be injurious. But, if restlessness and watchfulness arise chiefly from exhaustion, inanition, or morbid nervous susceptibility, — if the disorder be chiefly or altogether nervous — be independent of increased vascular action in the brain, — this and similar combinations, and especially those with the preparations of valerian, of æther, of ammonia, assafœtida, musk, various aromatics, &c., will be most advantageous. In more doubtful circumstances, the combination of opium with ipecacuanha, soap, and a little capsicum, has proved beneficial in my practice. When hepatic derangement is present, or when some degree of vascular excitement still remains in the brain, opiates, conjoined with calomel and James's powder, is sometimes of use; but they should, even in this combination, be prescribed with caution and discrimination.

478. The question as to the employment of opium or morphia, in *enemata*, and *endermically*, is altogether subordinate to that respecting the circumstances in which this medicine is indicated. When these circumstances are clearly manifested, the usual mode of exhibition should be tried, at least, at first, — more especially as it admits of the combination of opiates with other remedies. But, when there is great difficulty in administering them by the mouth, or when they fail of affording the desired benefit, although obviously indicated, then the acetate or muriate of morphia may be sprinkled on a blistered surface, from which the cuticle has been removed; or any of the preparations of opium may be prescribed in enemata. Owing, however, to the occasionally rapid absorption of fluids from

the rectum and colon, a much smaller dose of opium should be exhibited in this than in the usual way. From ten to fifteen minims of the tincture may be administered every six hours. I have found the compound tincture of camphor and the syrup of poppies severally of use; from one to two drachms of the former, and from two to four drachms of the latter, being thus employed, but at different times, or in separate cases. When the patient awakens from sleep procured by the use of opiates, in a state of increased excitement, their exhibition should be relinquished.

479. *b. Hyoscyamus* has an advantage over opium, in neither constipating nor stupefying the patient. In order to obtain decided soporific effects from the extract, a dose of from ten to fifteen grains should be given at bedtime, or from a drachm to a drachm and a half of the tincture. It is apt to produce dryness of the mouth and fauces, and heat or irritation in the stomach; but it calms the circulation, and allays nervous susceptibility and irritation. It is very serviceable in cases characterised by morbid sensibility and irritability, and is much praised by Fothergill, Willis, Stoerck, Selig, Meyer, and Hufeland. Dr. Prichard does not consider it to be a remedy of great importance; whilst Dr. Burrows views it in a much more favourable light. The opinion of the latter physician accords more with my own experience. It is often of great service, when prescribed with camphor.

480. *c. Belladonna* has been recommended in mania by Theussinck, Vogel, Buchoz, Ludwig, Remer, Schmalz, and Hufeland. J. Franck advises it in mania complicated with epilepsy; and Müller prefers the powdered root to the extract, and gives it in gradually increased doses, until the pupil becomes dilated. It has been chiefly employed in the forms of extract and tincture in this country, and is favourably mentioned by Dr. Seymour and Dr. Burrows. Dr. Millingen states that he has found belladonna preferable to hyoscyamus or conium; and that the external employment of the extract, according to the endermic method, has been very effectual in reducing excitement, more especially when applied to the epigastric region. In the case of a female, to whom I was very recently called in consultation, and for whom the indications (§ 440. 475.) for narcotics and restoratives were very manifest, the following pills were prescribed with great benefit: —

No. 271. ℞ Extracti Belladonnæ gr. ij.; Camphoræ rasæ gr. xij.; Ammoniæ Carbon. gr. xij.; Pulv. Capsici gr. iij.; Pulv. Acaciæ et Balsami Peruviani q. s. ut fiant Pilulæ viij., quarum capiat duas, sextis horis.

481. *d. Stramonium* has been employed in mental disorders by Allioni, Maret, Stoerck, Remer, Reil, Greding, and Barton, chiefly in the form of extract and tincture. The vinous tincture of the seeds, made by infusing two ounces of the bruised seeds in eight ounces of Spanish wine, and one of alcohol, acording to most of the German Pharmacopœias, has been recommended by Schneider and Hufeland in doses of ten to twenty-five drops, twice or thrice daily. Dr. Burrows states that one grain of the extract of stramonium has procured several hours' sleep in furious mania, when other narcotics, in considerable doses, had not succeeded; but the patients were much more violent when they awoke. This result too frequently follows the use both of stramonium and of belladonna. The effects of these narcotics, when given in considerable doses, should be carefully watched, and distinguished from the more unfavourable symptoms observed in mania. When dryness of the throat, dilatation of the pupils, anxiety, vertigo, convulsive movements of the extremities, &c., appear, as well as when mental excitement is increased by them, the employment of them should no longer be persisted in. — The extract and tincture of *aconite* have been prescribed by Durande and others; but it is a dangerous medicine in most forms of mental disorder. — *Conium* is less useful than hyoscyamus, and hence unnecessary.

482. *H. Sedatives.* — *a. Digitalis* has been praised as a remedy in mental disorders by Darwin, Ferriar, Currie, Fonzago, Jones, Müller, Guislain, Uwins, Burrows, Ellis, and others. Dr. Cox ranks it next to emetics; and thinks that its efficacy is attributable as much to the nausea it creates, when given in sufficient doses, as to its power over the circulation. Dr. Hallaran considers that, when it is given after the system is reduced by proper evacuations, and particularly by repeated purges of calomel, it is more to be trusted to than any other remedy. Besides its capability of restraining the heart's action, he supposes it to possess remarkable anodyne and soporific qualities in maniacal cases. He commences its use in doses of five or ten drops of the saturated tincture, thrice daily, and gradually increases the dose to fifty drops. Dr. Burrows remarks, that the propriety of lowering the system, by depletions and purgatives, before the exhibition of digitalis is begun, is confirmed by his own experience; and that he perfectly concurs with Dr. Hallaran in considering this medicine as having a very powerful influence in all the stages of insanity accompanied with great vascular excitement and a rapid pulse. Dr. Prichard observes, that the cases in which digitalis is most likely to be useful, are those attended by great arterial action, and high mental excitement. M. Foville considers that it is chiefly beneficial in those cases in which the mental affection is complicated with hypertrophy of the heart. I may remark, respecting this substance, that, when the large doses advised by Dr. Hallaran are given, the well-known effects of it should be carefully watched; and, as soon as they begin to appear, camphor, ammonia, æther, &c. should be had recourse to, and its use relinquished. Digitalis is useful, also, in other forms of the malady besides those particularised above, — and even in the low states of derangement, — when conjoined with camphor, ammonia, and other remedies. In these, as well as in other forms of the disorder, I have given it with great advantage in the following manner, after evacuations had been freely procured: —

No. 272. ℞ Camphoræ rasæ gr. iij.—v.; Pulv. Digitalis gr. ij.; Extr. Hyoscyami gr. vij.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ iij., horâ somni sumendæ.

No. 273. ℞ Camphoræ rasæ gr. ij.; tere cum Mucilag. Acaciæ ʒj.; Aquæ Menthæ virid. ℥j.; Spirit. Ætheris Sulph. Comp. ʒj.; Tinct. Digitalis ♏ x.—xx.; Tinct. Hyoscyami ʒss. M. Fiat Haustus, bis terve in die sumendus. — Vel,

No. 274. ℞ Tinct. Digitalis ♏ x.—xx.; Tinct. Hyoscyami ʒss.; Spirit. Ammon. Arom. ʒss.; Liq. Ammoniæ Acetatis ʒij.; Mist. Camphoræ ℥j.; Syrupi Aurantii ʒss. M. Fiat Haustus, ter in die sumendus.

483. *b. Prussic acid and laurel water* have

been recommended as sedatives in various forms of insanity. The latter was advised by Thilenius; the former, by Dr. Seymour and Dr. Balmanno. Dr. Burrows states, that he made trial of prussic acid, but never derived permanent benefit from it in any one case.

484. *c. Tartar emetic,* in small and frequently repeated doses, in order to reduce vascular excitement in the brain, as well as in the system generally, was recommended by Willich, Müller, Bodel, Frize, Burserius, and Baldinger. A combination of it with tartrate of potass, so as to act also upon the bowels, was advised by Pideret, Fordyce, and Hufeland. Several writers have prescribed it so as to produce more or less continued nausea. Drs. Cox and De Vos, of Berlin, consider it of great service when vascular action is excited, and when the hæmorrhoidal or menstrual discharges have been suppressed, or the portal circulation obstructed. These are, indeed, the circumstances especially requiring it, whether existing in mania or monomania, and more especially in the sanguine or bilious temperament. Where there is more obvious vascular inanition or exhaustion, and in nervous and susceptible persons, a continued use of tartar emetic is injurious. The indications for, as well as against, this medicine, are nearly the same as those which relate to vascular depletions.

485. *d. Cold water,* drunk in large quantity, has been praised by Lorry, Theden, Hilscher, and Hufeland, in melancholia and mania. I have seen it beneficial in melancholia complicated with hysteria. Avenbrugger advised it in those cases especially which are attended by a desire to commit suicide. Falret and Guislain, however, observed no benefit accrue from it in such circumstances. It is probable that, in the very few cases in which it has proved useful, it has acted chiefly as a sedative of irritation in the digestive mucous surface and collatitious viscera, that has excited or perpetuated disorder of the cerebral functions. The remarkably large quantities of water taken almost hourly in most of these cases, may likewise have tended to remove obstructions from some one of the abdominal organs. — Cold water acidulated with the *vegetable acids,* and more especially with *vinegar,* was recommended by Buchoz, Theden, Locher, Selig, and Bang, as a sedative and refrigerant of the vascular system; and in order further to promote this intention, small doses of *camphor,* or of *camphorated vinegar,* were advised by Bona, Perfect, and others. — *Nitre* was also similarly employed, either alone, or with small doses of camphor, so as to secure the refrigerant and sedative effects of the latter. Cold water, medicated in either of these modes, and in the latter more particularly, or by the addition of the *spirits of nitric æther,* is more likely to be of service than when used simply. *Muriate of ammonia,* however, is preferable to nitre, in most cases, — inasmuch as it combines a tonic influence with its refrigerant and sedative properties. — *Acetate of lead* was likewise used by Schrœder as a sedative and refrigerant in mental disorders attended by vascular excitement; but no notice has been taken of it in such circumstances by recent writers. In conjunction with vinegar and narcotics, it is as likely to be of service in these disorders, as in several others in which it has been lately employed. — The *biborate of soda,* and *boracic acid,* were also formerly employed in order to allay vascular action in connection with mental excitement. They have long fallen into disuse; but I have had reason to consider them as still deserving of notice.

486. *I. Stimulants* and *Antispasmodics* are especially indicated in nervous temperaments and delicate constitutions, or whenever the mental disorder appears in connection with deficient nervous or vital power, — when the head is cool, and the mental affection is independent of vascular fulness or action, — when sanguineous depletions and alvine evacuations have been carried sufficiently far, — or when exhaustion follows either these, or the previous excitement. In other circumstances, particularly if the scalp continue warmer than natural, or the carotids pulsate somewhat more strongly, these may still prove of service, if refrigerants be applied to the head; or they may be conjoined, in such circumstances, with sedative and diaphoretic medicines. Of stimulants and antispasmodics, the most frequently useful are, *camphor, valerian, ammonia, assafœtida, æther,* and *the compound spirit of æther.* Others have been employed, as the *oxides of bismuth* and *zinc, castor, serpentaria, arnica, electricity,* and *galvanism.*

487. *a. Camphor,* in the circumstances just specified (§ 486.), is a valuable remedy, and as such has been recognised by Wherlhof, Loebenstein, Kinneir, Fischer, Remer, Avenbrugger, Perfect, Percival, and Hufeland. On the other hand, Haslam, Prichard, and Burrows esteem it of little value. Its influence in this, as well as in other diseases, is very different, according to the doses and combinations in which it is exhibited. Many years since, I entered upon a series of experiments, in order to ascertain its operation in different conditions of the system; and in a paper published some time afterwards (*Lond. Med. Repository,* for Sept. 1825, p. 245.), I stated the result of my researches, and of my experience of it in some cases of mania, which I had seen with Mr. Alcock, Mr. Carroll, and others. Since then I have prescribed it in several cases, both of mania and melancholia, and, generally, with more or less benefit. Dr. Millingen, in a work just published, forms a juster estimation of it than many other recent writers. He states it to be a valuable medicine, but requiring much discrimination. It is not advisable, he adds, when there is cerebral excitement, with a hot dry skin, full pulse, and wild countenance; but where there are much restlessness and uneasinesss, with a low weak pulse, or cold and clammy skin, it will be found most beneficial. This is altogether in accordance with what I have stated respecting it, in the paper just referred to. I have there shown, that camphor in very small doses is refrigerant; but in full or large doses it is restorative, exciting the brain and nervous system, and consecutively calming and anodyne. In mental disorders, it should not be employed until alvine evacuations, and sanguineous depletions, where these are required, have been duly employed. The combinations in which I have most frequently prescribed it, are with opium, morphia, or hyoscyamus, or belladonna, or with nitre, or with the solution of the acetate of ammonia, or with digitalis, or with James's powder, or other antimonials, or with the alkaline carbonates, or with acetic acid, or with any two of these that may

be congruous with the circumstances of the case. Selig, Schoenheider, and Perfect prescribed camphor with vinegar, and Friborg, with nitre and opium, in maniacal cases. The dose of camphor in mental disorders, as well as the combination and mode of exhibiting it, ought to be regulated by the peculiarities of the case, and the effects of the previous treatment. M. Esquirol usually directs from half a drachm to a drachm to be dissolved in two ounces of vinegar, or dilute acetic acid, and given in an aromatic infusion in the course of the twenty-four hours. I have found this mode very serviceable in puerperal and hysterical mania,— other appropriate means being also employed,—but smaller doses are more appropriate in many cases. Cold applications to the head, the shower bath, or tepid bath, &c. may also be resorted to during its use, or when increased heat of the scalp or skin is caused by it.

488. *b.* The *infusion* and *compound tincture of valerian* have proved, in some cases of mania and of monomania, or melancholia, in which I have employed them, of great service — more especially in the states of these disorders already described (§ 486.). When these affections are associated with hysterical symptoms, or when the patient entertains the idea of committing suicide, or has a disposition to indulge or to adopt any dangerous caprice, these preparations are often beneficial,—particularly after appropriate evacuations, and in combination with the solution of acetate of ammonia, or with the alkaline carbonates, or with digitalis, hyoscyamus, &c. — *Musk* has been advised in similar circumstances by Thilenius, Locher, Selig, Pargeter, and Gmelin; but it, and *castor, ammonia, assafœtida,* the *oxides* of *bismuth* and *zinc,* and the *æthers,* are severally inferior to either camphor or valerian: yet they are often useful, especially as adjuncts to other stimulants and restoratives, or to narcotics or sedatives, or even to tonics, in the more strictly nervous forms of insanity, and in cases of debility and exhaustion.

489. *K. Tonics* were recommended by Sydenham, Selig, and Wintringham; and are obviously required in most of the circumstances in which stimulants and antispasmodics are indicated, and particularly in cases manifesting more or less of vascular inanition. — *a. Cinchona* or the *sulphate of quinine* — the latter especially — is often preferable to other tonics, more particularly in the intermittent forms of insanity. The infusion of bark with the solution of the acetate of ammonia is most suitable when vasaular or nervous excitement is passing into exhaustion, or in cases where the propriety of having recourse to tonics may seem doubtful. In circumstances of obvious exhaustion, or inanition; in the more purely nervous states of disorder; in advanced stages, after evacuations have been carried sufficiently far, or when the head is cool, and the pulsations of the carotid are not increased in strength or fulness; the sulphate of quinine, either alone, or with camphor, and with the extract of aloes if the bowels require to be kept freely open, will often be of service. I have given the following pills, varied with circumstances, in several cases of partial and general mental disorder; — the first, when the bowels are costive; the second, when they are too relaxed. In this latter state, a combination of cinchona and opium was recommended by Ferriar.

No. 275. ℞ Quinæ Disulphatis ʒss.; Camphoræ rasæ ℈ij.; Extr. Aloës purif. ʒss.—℈ij.; Extr. Hyoscyami ʒjss.; Balsami Peruviani q. s. M. Fiant Pilulæ L., quarum capiat tres, bis terve in die.—Vel,

No. 276. ℞ Quinæ Disulphatis ℈j.; Camphoræ ʒss.; Extr. Humuli ʒjss. (vel Pilulæ Saponis cum Opio ʒj.); Syrupi Simp. q. s. M. Fiant Pilulæ xxxvj., quarum capiat duas, vel tres, bis in die.

490. *b.* The *arsenical solution* has been prescribed by Neumann, Winckler, Ackermann, and Seymour; and, in states and circumstances of the disease for which I have advised the sulphate of quinine, — and especially in the intermittent forms of insanity, — is well calculated to be of service. It requires not only great discrimination in entering upon the use of it, but also caution as to the quantity prescribed, and the continuance of a course of it; as excess in either may be followed by inflammatory irritation of the digestive mucous surface — especially in the large intestines; or by endocarditis.

491. *c.* The *nitrate of silver* has been recommended by Agricola and Kesler; and, in circumstances truly indicating the propriety of tonics, and when insanity has been occasioned by depressing or exhausting causes, and in purely nervous cases, it may prove of service. It has been considered as more particularly suited to the complications of mental disorders with epilepsy. When, however, this association is dependent upon vascular or structural disease of the encephalon, little or no benefit can result from it. I prescribed it lately in one case of this kind; but was obliged to discontinue it. I have, however, found it of service in two cases of melancholia, with chronic irritation of the digestive mucous surface.

492. *d.* The *infusion* and *tincture of hop* have been recommended by Dr. Mayo; and, in the numerous circumstances and cases of the disease requiring both tonic and anodyne remedies, they are appropriate, and likely to prove serviceable. They, moreover, admit of various useful combinations with other remedies in mental disorders.— The *preparations of iron,* and chalybeate mineral waters, have been employed by Lange and others. They are beneficial in several states of mental disorder, — and especially in the more purely nervous cases, and in states of vascular inanition, — or when derangement has proceeded chiefly from masturbation, or exhausting discharges. — The *sulphate of copper* has been prescribed by Boerhaave and Currie. It is suitable chiefly in diarrhœa occurring in chronic mania, and dementia. — *Absinthium* was used by Aretæus and Paulus Ægineta; and the *muriate of baryta,* by Hufeland.

493. *e.* Various other *stimulants and tonics* have been recommended by writers on mental affections; but very few of these require particular notice.—*Phosphorus* is mentioned by Loebel and Kamer. Its powerfully stimulant qualities require great caution in its use. Formulæ for exhibiting it are to be found in the *Appendix* (F. 6. 7. 428.).—The extract of *nux vomica* is noticed by Murray and others: it also requires great discrimination in employing it (see F. 541, 542.). Both these substances are suitable only in the more nervous forms of mental disorder, — especially in melancholia, and dementia, proceeding from exhausting and depressing causes; and in the circumstances indicating the adoption of the more energetic stimulants, and of chalybeates. In dementia and chronic mania complicated with

general palsy (§ 167.), these medicines may be tried, upon the principle adopted by Celsus — "*Melius est anceps remedium, quam nullum.*"— The *chelidonium* was prescribed by Müller, on account of its stimulant, laxative, and diuretic properties. As it promotes the secreting and excreting functions, and thereby exerts a deobstruent and alterative influence, it may be tried in mental disorders complicated with obstructions or other diseases of the abdominal viscera, — and especially in melancholia. — The decoction of *hypericum* was praised by Meyer and others. It is nervine and stimulant, and is most appropriate in the more purely nervous states of mental affection, and in melancholia, after sufficient alvine evacuations. Dr. Mayo observes, that the use of restoratives and tonics in the first stage of insanity is valuable in the nervous and serous states, but mischievous in the bilious and sanguine; and that, in the stage of exhaustion, they are required in every temperament.

494. *L. External Irritants* and *Derivatives* have been long and generally recommended in the treatment of mental affections. They may be divided into — 1st, *Irritants applied to the scalp*; and, 2d, *Irritants applied to parts more or less remote from the head*, so as to produce some degree of revulsion or derivation from the seat of morbid action. — *a. Scarifications of the scalp* were advised by Aretæus, Cælius Aurelianus, Walther, and Prichard; but they are admissible only when the scalp and head are more or less congested, or when inflammatory irritation or structural change is inferred to exist in the encephalon. In nervous and susceptible persons, and in states of general or local inanition of the vascular system, they may prove injurious. The application of the *actual cautery* to the occiput, or of *moxas* in the same situation, as advised by Pascal, Larrey, and Valentine; and artificial *ulceration* of, or *setons* or *issues* inserted in, the scalp, as prescribed by Horn and others; are indicated and contra-indicated by the pathological conditions just mentioned. Inunction of the tartarised antimonial ointment on the shaved scalp, until a copious eruption of pustules is produced, was advised by Monro, Autenrieth, Jenner, Gumprecht, and others; and has been found of service in some cases of mania, — especially when the acute stage is beginning to decline, or to pass into the chronic state. — The application of *blisters to the head* was recommended by Thilenius, Dürr, and Hufeland. The practice is not without hazard, particularly in the more acute states of mental disorder. It is more appriate in the more chronic and low forms of derangement, and especially in imbecility and dementia.

495. *b.* The application of irritants so as to produce a *derivative* or *revulsive effect* is appropriate in many of the more acute and early, as well as in the more chronic, states of mental disorder; and yet, in very irritable, nervous, and susceptible patients, in the early stage of mania, and in cases where the vascular system is rather deficient, than too full, of blood, these irritants often increase disorder, by exciting the general sensibility. Where, however, the disorder has been consequent upon the suppression of accustomed eruptions, ulcerations, and discharges; and in many cases of melancholia, or of other forms of monomania; derivatives and revulsants are often of much service. In the more acute and recent cases, and especially of mania, they should not be resorted to until vascular depletions and other evacuations have been employed.

496. Various *modes* of producing derivation of disorder from the brain have been recommended. Several of these are already noticed, as also falling under other heads, — especially purgatives, warm bathing, &c. — *Blisters* on the nape of the neck, or on the legs, &c., are often resorted to; but they are seldom of service in mania, — especially in the early stages. They are useful chiefly in the states of disorder just mentioned. Guislain recommends them to the nape, back, or insides of the thighs or legs, when insanity commences with depression of mind or melancholia, and in some states of dementia; but he has rarely found them serviceable in this latter state. Avenbrugger applies them to the region of the spleen, in melancholia; and, when prescribed either to the epigastrium or to the hypochondria, they are sometimes of service in that affection. More advantage may be expected from *issues* and *setons* than from blisters, unless the latter be kept open for a considerable time. Zacutus Lusitanus advised setons or issues to be inserted over the region of the liver or spleen in melancholia. In the majority of cases, however, their insertion in the nape of the neck is preferable, — especially in the other forms of insanity. — *Dry cupping* in this situation is often of service. Dr. Burrows suggests the application of the cups as a derivative to the shaved scalp itself; and, doubtless, this place will often be preferable. I have, in some instances, caused the nurse or attendant to resort to dry cupping on the nape several times in the day, and to employ merely a large glass, tumbler, or any other convenient article, for this purpose, and a piece of lighted paper.

497. The production of *irritation*, or *artificial eruptions* on parts of the body still more distant from the brain, or on the surface generally, has been advised, in order to remove irritation from this organ. They are commonly produced by the *tartarised antimonial ointment*, and by *frictions* with *croton oil*. Thilenius, Odier, Muzell, and Bartholomew recommend *inoculation of the itch*. Besides these, warm mustard *pediluvia*, *mustard poultices* applied to distant parts, and particularly to the lower extremities, the hot *turpentine embrocation* in situations remote from the brain, and *irritating* or *cathartic enemata*, may severally be employed, in circumstances which seem to require them, — and especially when a tendency to coma or lethargy is observed.

498. *c.* Of the various *modes* of external irritation, Dr. Burrows and Dr. Müller consider *pustulation* by means of the tartarised antimonial ointment or plaster, the best; and they prefer the application of it to the shaved scalp. Dr. Millingen prescribes it to the back of the neck. The choice of situation should depend upon the form and stage of disorder. In dementia, in cases attended by stupor or impaired sensibility, and when melancholia or mental depression is threatening to pass into excitement, the scalp may be preferred, after due evacuations have been procured. In some states of mania or monomania, this ointment or plaster may be applied to other

parts. M. GUISLAIN states that he has derived little advantage from it in dementia; but that he has sometimes found it of service in melancholia and in mania. Dr. JENNER published several instances of its success, when applied to the epigastric region, nape of the neck, scalp, and other situations. During the eruption thus produced, a restorative treatment is often necessary.

499. The insertion of *setons* in the neck is considered by Dr. PRICHARD to be most advisable in mental disorders of a chronic form; but he also recommends *issues* made by a long incision in the scalp, over the sagittal suture, where there is great intensity of disease, and a state of the brain threatening a fatal increase. In cases of stupor, and of dementia following apoplexy or palsy, or severe fevers, he believes this method more beneficial than any other. He also suggests a recourse to it in the complication of insanity with general palsy.—M. ESQUIROL remarks, that *dry cuppings*, blisters, and irritating applications are most successful in cases consequent upon metastasis, in monomania attended by stupor, and in dementia uncomplicated with convulsions or paralysis. There can be no doubt of *counter-irritation* being more appropriate in cases characterised by torpor and insensibility, instead of morbid activity or excitement and intensity of feeling. Dr. PRICHARD observes, that, in almost every case of paralysis, with a tendency to coma and lethargy, in which he has used this class of remedies, he has witnessed decided advantage from them. The opinions of Dr. N. HILL, M. GUISLAIN, and of Dr. MAYO, are also in favour of these means.

500. iii. MORAL TREATMENT. — Recourse to moral management has either been too much neglected, or too exclusively adopted. It is but seldom that the truly philosophic physician is satisfied, even in the present day, that physical treatment is duly associated with moral management; or that either, or both, are appropriately directed to the removal of existing pathological conditions, and of the associated mental disturbance. Yet both physical and moral means should be judiciously conjoined and directed to the peculiar circumstances of each case. — It is impossible, especially in my confined limits, to describe the impressions which should be produced, and feelings excited, in order to combat the various states of mental disorder that come before the physician. These means, to be appropriate and beneficial, must necessarily vary in each instance, and be so entirely based upon the ever varying phases of disorder, as not to admit of description. Yet much useful information on this subject, and even the principles of moral management, will be found in the writings of Sir H. HALFORD, Dr. MAYO, Dr. PRICHARD, Dr. BURROWS, MM. GUISLAIN and ESQUIROL.

501. *a*. It is chiefly at the commencement of mental disorder, and when the stage of excitement is about to lapse into comparative calm, that moral treatment is most beneficial. Still it should not be neglected at any period, as long as the patient retains any power of comprehension. Dr. MAYO observes, that, supposing the morbid state to be commencing, every effort must be made to strengthen the influence of the will. The patient, at this period, gradually surrenders himself — though not without a struggle — to some prevailing idea, fear, or delusion: he supposes his friends to be conspiring against him, or insulting or watching him; or he believes calamities of various kinds impending over him. Meanwhile he is struggling against the morbid impression. His efforts, therefore, whether manifest or not, must be aided when right, and his mind tranquillised. His fears should be shown to be unfounded, and his hopes excited and encouraged. To administer this aid is generally a matter of difficulty. The danger of mischief to himself or others, as well as the occasional necessity of repression, dictates *surveillance* (which is always irksome and distasteful), when it is most requisite to conciliate regard.

502. In this state of commencing or impending insanity, the morbid sensations or perceptions, and the unreal ideas or assertions of the patient, should not be rudely contradicted, and imputed to imagination. They are *real to him*; and to controvert them, is the readiest way to irritate the mind, to destroy all his confidence in the judgment and friendship of his adviser, and to strengthen and confirm the disease. His mind requires to be soothed, diverted, and abstracted from the fears and anxieties, by which it is absorbed, depressed, and exhausted. He should be told, that his feelings and perceptions will soon change, as his health improves: he should be comforted by admitting the justness of his complaints, and cheered by attributing them to a temporary disorder of his general health, which will be removed by suitable remedies; and these remedies ought always to be resorted to, in order, both that such disorder, which is never absent, may be cured, and that his confidence may be gained. At the same time, that such admissions are made, and that the utmost kindness and encouragement are evinced, the greatest firmness must be exercised: nothing should be yielded, that ought not to be conceded. He will thus be brought to look for support, and to trust to it, against his own instability and weakness of purpose, as well as for aid in his struggles against morbid impulses and desires. In this incipient stage of mental disorder, much consequent mischief may be prevented by judicious moral management,— by moral and religious consolations, mental abstraction, and diversion; by firmness, kindness, and moral control; by change of occupation, of scene, and of air; by travelling or voyaging; and by the amusements and intellectual *agrémens* of society. Foreign travel is generally preferred in these cases, as affording greater novelty; and visiting watering places, and mineral springs, in connection with travelling, presents several advantages. These conspire, with other circumstances, to excite, or to preserve hope, at the same time that they may be beneficially directed to the removal of physical disorder. At this period, nervous power is depressed by the continued operation of debilitating fears and sensations, whilst the assimilating, secreting, and excreting functions are impaired; and, hence, recourse to chalybeate, sulphureous, or saline waters, or to various combinations of these, in conjunction with moral influences, is frequently of the greatest benefit, — especially in the hypochondriacal and melancholic states of disorder. In addition to these, regular *exercise* in the open air, — particularly walking and riding, — and, still more, exercise and occupations which interest the

thoughts and engage the feelings in an agreeable manner,— as tennis, cricket, fishing, shooting, hunting, gardening, farming, &c.—should be enjoyed, with due precautions against injurious physical agents. The patient should almost altogether live in the open air; but the air should be dry and temperate, and the situation elevated. In unfavourable weather, in-door exercise and occupations should not be neglected. Amusements, also, may be often permitted, especially billiards, chess, backgammon, &c.

503. *b.* Even in the more *violent mental explosions* observed in mania, or when intense *reaction* follows upon depression or melancholia, moral restraint and discipline is often of great service. The union of firmness with kindness, even in such circumstances, is not to be laid aside. As M. Pinel observes, the physician sustains, in these cases, the sentiment of his dignity, and the principles of a pure and enlightened philanthropy. He allows the maniacs all the liberty compatible with the safety of themselves and of others; conceals from them the means of constraint, which he is obliged to employ; and, treating them with indulgence, leads them to suppose that they are only submitting to the laws of necessity. M. Georget remarks, that active and incessant inspection must be exercised, particularly in an asylum, over both patients and attendants. Lunatics evincing a disposition to suicide, should never be a moment out of sight. It is often necessary to confine violent patients, and those who are addicted to indecent practices, with the strait waistcoat. The only measures of punishment, he adds, that should be practised, are the strait waistcoat, seclusion in a cell, the shower bath, and some occasional privations. Dr. Prichard justly observes, that all means of punishment and intimidation should be used as sparingly as possible, and be of the most harmless kind. Solitary confinement, and the strait waistcoat, are sufficient in ordinary cases. M. Foville has recourse to the cold shower bath, and to cold affusion on the head; the violent maniac being seized by a number of attendants, and subjected to the affusion until he becomes subdued. The circular swing has been used with a similar intention; and after it has been once used, a threat of its repetition is frequently sufficient; but the cold affusion is a safer remedy. When obstinate lunatics refuse to take food or medicine, persuasion should be first tried; and if it fail, threats and harmless punishments may be adopted. The stomach-pump may be had recourse to in these cases; the use of it on one occasion will generally prevent the necessity of again employing it.

504. M. Guislain justly remarks, that the physician ought, as much as possible, to abstain from saying or doing any thing before a lunatic, calculated to inspire fear or dread, or by which he might become an object of aversion, or lose the confidence of the patient. Some other person should appear to be the agent in all restraints or punishments that may be required; and the physician should be regarded as the protector of his patients, and the dispenser of kindnesses and indulgences.

505. *c.* When the *acute stage*, or the period of excitement, has passed, a calm usually follows; and, in this state of comparative composure, the morbid delusions adhere to the mind less pertinaciously. The patient himself often begins to doubt their reality; and his estranged affections seem disposed to return. The observations of Sir Henry Halford, on the moral treatment of this period, are particularly deserving of attention. "If, at this auspicious moment," observes this able physician and classical writer, "the intercourse of a discreet friend be permitted, it will cheer the patient's heart; while, by kindness and attention, the physician will easily get possession of his returning confidence, and *so* induce him to unbosom himself of the distempered notions which still continue to haunt him. These, although they be founded in palpable error, the physician will not combat, although he will take proper opportunities of hinting his doubts of their reality. He will never deceive his patient, but take pains to prevail upon him, whenever they recur, to refer them to his unbiassed and more practised judgment; and to be guided by that, rather than by his own, in estimating the correctness of such opinions. He will act, as it were, upon a system of education, and will aim thereby at confirming the spirits, and strengthening the mind of the convalescent: and as the discipline employed in youth encourages and enforces the predominance of reason over the passions, so will discreet converse assist in restoring reason to her seat, and in giving her back again her proper sway over wild impulses. He will engage the mind agreeably, by presenting to it new objects, and by recalling former pursuits to their wonted acceptance." "Had the patient, before he was ill," Sir H. Halford continues, "any favourite amusement of a harmless nature?—Was he fond of *music*, for instance?—Music, without exercising the attention severely, has the power, however, to fix it; therefore, with this 'sola voluptas solamenque mali,'—the only gratification, perhaps, of which he is capable at this period of his mental darkness,—he may be indulged immediately." "Or, had the patient, before he became insane, a predilection for any particular studies? —Would he take the counsel of Lord Bacon, and entertain such as fill the mind with splendid and illustrious objects, as histories, fables, and contemplations of nature?—Or, did he prefer mathematics? and can he now be prevailed upon to enter upon a course of such reading?—Plato has called mathematical demonstrations the purgatives of the soul, as being the most proper means to cleanse it from errors, and give it a relish for truth. Certainly, nothing more entirely bars the intrusion of thick-coming fancies, by occupying the whole mind, than mathematical studies."—Sir H. Halford states, that Dr. A—— became deranged, whilst practising physic in the country, and, after a separation from his family for some months, was advised to resume the study of Euclid, having dropped hints of his partiality to it. He did resume it with the happiest effect, and recovered at length so entirely as to commence business in London, and to practise until his death.

506. Experience has shown, that monomaniacs are injured by directing their attention, or by adverting in any way, to their illusions. It is, on the contrary, requisite to engage their minds as much as possible with very different subjects, and with external objects. Still authors have adduced instances of persons having been cured of their delusions by some deception. Thus M. Esquirol states, that a lunatic would not pass his urine, because he supposed that, by doing so, the

world would be subjected to a second deluge. He was at last prevailed upon by being told that the town was on fire, and that he could save it from the flames. But any advantage obtained in this manner, is generally only temporary. During convalescence, powerful impressions on the mind, even in connection with the patient's delusion, may rouse the patient, as if from a dream, and thus dispel the unreal impression. A female patient had taken the most violent dislike to her family; the tidings of the death of a son in a foreign country excited in her a desire to see her surviving children, and recalled all her parental affection, instantly sweeping from her mind her insane antipathies, and restoring her to right feeling and reason.—(*Rep. of Glasg. Asyl. &c.* for 1839.)

507. On this subject Dr. Burrows remarks, that to reason with a lunatic is folly; to oppose or to deny his hallucinations is worse, because it is sure to exasperate: an impression on him can be made only by talking *at*, not *to*, him. He will often notice what is said to others, and apply much of it to his own situation or delusion. To endeavour to convince him, or to break the catenation of his morbid ideas, by trick, fraud, surprise, or terror, is always attended by hazard. The chances are very many that it will not succeed; and, if it fail, the case is thereby rendered more intractable. "The confidence of his patients," Dr. Burrows adds, "is the sure basis of the physician's success. A cheerful, encouraging, and friendly address; kind, but firm manners; to be patient to bear, but cautiously prudent in answering; never making a promise that cannot safely be performed, and, when made, never to break it; to be vigilant and decided; prompt to control when necessary, and willing, but cautious, in removing it when once imposed;—these will always acquire the goodwill and respect of lunatics, and a command over them that will accomplish what force can never attain."

508. Moral management must necessarily vary with the states of the disease. In the more violent state, restraint and medical discipline should be applied until violence subsides. In the more passive states, restraint is never necessary, unless there be a propensity to suicide, or to a solitary vice which is so frequently a cause of, as well as often an attendant upon, the mental disorder. To prevent this latter propensity is extremely difficult; but various means may be had recourse to with advantage,—and these will readily suggest themselves.* Vigilance is necessary in all cases; for the passive may change in a moment to the active or violent state, and mischief may thus be done before it can be prevented.

509. *d. During convalescence* especially, moral treatment requires the greatest judgment and discrimination in all its relations. In this period, the dawnings of reason should be carefully observed and assisted, and every aid afforded to the struggling efforts of nature. The bodily disease is now loosening its hold over the mental powers; and these powers may be now aided in emancipating themselves from the morbid bondage. The suggestions, and occasionally the reasoning, of the physician advanced with kindness and sincerity, and in the soothing language of friendship, in this stage, often assist in removing weakened and decaying delusions. When convalescence approaches with a revival of the affections, the consolations of the physician are often requisite to calm the feelings which thus burst forth, and to guide them in right directions; or his encouragements are necessary to elicit them, and to give them permanency. Dr. Burrows justly remarks, that if, in reasoning with the patient on any remaining delusion, a painful recollection is revived, the subject should be changed, and resumed at another time. If any domestic event have occurred, during the loss of the patient's reason, likely to excite a strong feeling of joy or of grief, it should be withheld until the mind has acquired strength to bear it; and even then caution in communicating it is requisite. One of the most important and delicate tasks, in communicating with a convalescent, as to the past and present, is to preserve a due medium between gratifying and checking his eager importunities for information. Too great a flood of reminiscences, called up by much information, may endanger the mind enfeebled by disease. The recollections of the past affect different minds very differently. With some, the retrospect is a perfect blank; others remember the past as a dream; others recollect all its realities. Some refer to the past with indifference; others advert to it with gratitude to those who contributed to their recovery; others recall it with pain and abhorrence, and avoid all reference to person, place, or circumstance connected with it. Whatever may be the impression on the mind of the patient, it should be carefully noted, and the conversation with him should conform to it.

510. *e. Religious consolation* is frequently of the greatest benefit in the partial and chronic forms of insanity, when judiciously resorted to. It has been, however, supposed by some to be injurious, or of doubtful advantage, because religion is sometimes a cause of the malady. But, as I have shown (§ 293.), it is only mistaken, unsettled, and fanatical views of Christian doctrines that occasion, in some instances, mental disorder; and, even in these cases, as well as in many others, the truths and consolations which true religion affords, may be made most efficacious means of cure, when judiciously placed before the mind of the patient, at a proper season, by the well-educated and sober-minded clergyman, and when the physician finds no circumstance contra-indicating the propriety of having recourse to them. Mr. Tuke very judiciously remarks, that the mild but powerful influence of the precepts of our holy religion, where these have been strongly imbued in early life, become little less than principles of our nature; and their restraining power is frequently felt, even under the delirious excitement of insanity. Before, however, religious consolation or instruction should be attempted, some information should be acquired of every patient's former and present opinions and

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* Sir W. Ellis recommends a pair of wide canvas sleeves, connected by a broad shoulder-strap, so as to rest easily on the shoulders. They ought to come up well on the shoulders, and to extend about an inch beyond the points of the fingers; the part covering the hand being made of stiff leather, to prevent the hand grasping any thing. They keep the arms hanging easily by the sides of the body. They are fastened at the back by two straps,—one going from one sleeve a little above the elbow, across the loins to a similar position in the other sleeve; a second lower down; and by three similar straps in the front, the latter being secured by buckles. This mode of restraint is less heating, and produces less pressure on the chest, than the common strait waistcoat.

state of mind: and then religion will often be most advantageously brought in aid of physical and moral treatment; and will tend not only to the restoration of the mental powers, but also to the preservation of them subsequently. The minister of religion, in order to be useful, should have free intercourse with the patient; and administer consolation, or remove doubts, rather by private communication, than by more public instruction or preaching. When the latter is attempted in an asylum, a judicious selection ought to be made of the patients, and the discourse should be suited to their states,—to inspire hope and confidence,—carefully avoiding whatever may perplex the mind, or cause fear or alarm.

511. In a recent report of the Glasgow Asylum for Lunatics, it is stated that, in many instances, the personal and private, as well as public, ministrations of the chaplain have carried consolation and comfort to the minds of the patients, particularly those troubled with distressing apprehensions on religious subjects. The sermons delivered in the chapel are described as being adapted, as much as possible, to the peculiar circumstances of the audience; and as being the means of withdrawing their attention, for a time, from their prevailing illusions. Every thing that is conceived to have a tendency to agitate the mind is carefully avoided, and pains taken to present the most soothing and practical views of Divine truth. Two very important advantages are derived to the patients from the institution of public worship,—that of alleviating the malady under which they labour, and that of gratifying and strengthening those pious feelings from which they derive the greatest consolation.

512. *f. Employments and Amusements.*—*Exercise*, by equalising the circulation, by determining it to muscular structures and to the extremities, and by promoting the exhalations and secretions, is of great service in the partial and chronic states of insanity. But it must be varied according to circumstances, and to the previous habits, conditions, and occupations of the patients. Walking and riding in the open air, or long walks in fields and woods, in company with a suitable guardian, during as great a portion of the day as the strength of the patient will permit, are often of great service. All establishments for the insane ought to be provided with the means of affording to their inmates regular exercise and employment in the open air. They should also be constructed with galleries and covered courts, freely admitting the air, where the patients may take exercise in wet weather. Gardening and various agricultural occupations should engage a considerable portion of time, at stated periods of the day. In manufacturing districts, many lunatics may be made to follow, as a means of distracting their minds from their delusions, their several callings. In the *Salpêtrière*, the women are permitted to sell a part of the produce of their industry, and to apply it to the relief of their necessitous families. Females and men of sedentary habits should be engaged, as much as possible, in some regular occupation. In many asylums—especially abroad—the females are occupied in embroidery, in spinning, knitting, sewing, and various fancy works. Most lunatics are disinclined to work; but kind entreaties, or the prospect of procuring the means of extra comforts, will often tempt them to do something. Even in the early stages of dementia, it is not impossible to induce such patients to work at some merely mechanical occupation. Employments, suited to the previous habits and stations of the patients, mitigate the disease, and tend much to promote the recovery of curable cases. Where the taste and previous occupation of the patient leads to study or sedentary pursuits, these should not be indulged for too long a period without relaxation, or to the neglect of proper exercise in the open air. The greatest difficulty is to find employment or amusement for the higher classes of lunatics. They soon tire of the same pursuit. Reading, chess, cards, bagatelle, billiards, and other games, should be diversified with bowls, tennis, gardening, walking, cricket, and various athletic exercises.

513. *Music* has been considered useful by several writers, as a means of abstracting the attention of lunatics from disordered trains of thought. M. GUISLAIN observes, that music is useful with reference—*first*, to those who play upon some instrument; and, *secondly*, to those who listen to it. It should also be viewed both as a means of beneficially exercising the mind, and as a mere amusement. Persons who can use a musical instrument, and those who are fond of music, will sometimes derive advantage from it; but it is doubtful whether or not it will afford any benefit to others. Dr. PRICHARD states, that Dr. Cox considered that some advantage was derived from it as an amusement; but, that it is of little importance in the treatment of insanity, is proved by the circumstance of Dr. BOMPAS, the successor of Dr. Cox in the asylum conducted by him, having discontinued it. M. ESQUIROL remarks, that he has very rarely obtained any advantage from music. It sometimes calms the spirits, but it exerts no curative influence; it may even render maniacs more furious. He, however, admits its beneficial influence during convalescence—particularly of those who have cultivated music, or who are fond of it. In the more lethargic or dull states of madness, in melancholia, and in other forms of partial insanity, it is often of service; whilst it may prove injurious in some cases of mania—more especially those characterised by a tendency to violent excitement. When the patient has been a performer, playing on his instrument is allowable, as innocently employing both mind and body.

514. *g. Visits of friends, and restoration to society.*—Convalescence is often checked, and the disorder reproduced, by the patient's impatience to be freed from all restraint; and the same effect is too often caused by the impatience and distrust of friends. During convalescence, the physician has not only, as Dr. BURROWS observes, to encourage every dawning sign of returning reason, to employ the soothing language of friendship, and to calm the agony which reminiscence often generates, but also to repress impatience, and to contend with and remove the suspicion and want of confidence, which his cautious course usually produces in relations and friends, and which, if not steadily resisted, endanger the approaching recovery of his patient. The chief risks to which convalescence is exposed, are the *premature visits* of friends, and *removal* from the proper sphere of treatment, to an intercourse with relations and society, and with busi-

ness and its various contingent annoyances and distractions, before the action of the brain, and the manifestations of mind, have been sufficiently restored, or the restoration adequately confirmed. The difficulty of determining when friends should be admitted, and when the patient should be restored to society, is generally great; and the evils resulting from a too long seclusion are sometimes not much less than those which might accrue from premature intercourse. The experience and good sense of the physician will enable him to arrive at a just conclusion with reference to particular cases, — for no general rule on this subject can be laid down. When convinced that either measure will be detrimental, resistance should be carried to the utmost; or until importunity, on the part of those who have authority, assumes the form of *command*. "In yielding, contrary to his judgment, the physician should distinctly throw all responsibility on the applicant; otherwise, the consequence, if injurious, will certainly be cast on him." (BURROWS.) I would add, that the commands of the friends, in such circumstances, should be required to be made in writing; as they will be much more cautious than otherwise in thus making them, and as evasions of responsibility will often be attempted, in this as well as in many other matters, when there is no written document to prove its existence.

515. Before permitting the visit of any person, the state of the patient's feelings and views to that person should be ascertained. It will be also preferable to select for the first interview some one who the least interests the patient's affections; and, if this communication is borne without any ill effect, a nearer friend or relative may be selected, leaving the object of warmest attachment to the last. Proceeding in this cautious way, Dr. BURROWS remarks, the too sensitive or feeble mind is gradually brought to bear a renewal of intercourse without being too much moved. But the physician might be deceived by the dissimulation of the patient, who will often assume an appearance of amendment merely to obtain an interview with a friend; his only object in seeking it being to request his release, or to complain of his treatment.

516. Cunning being a characteristic of madness, the physician should always be upon his guard against being imposed upon. Many are fully aware that, if they can conceal their delusions, they may be considered well; and, when only one delusion is entertained, it is often difficult to detect it. Dr. BURROWS had a patient, whose specific delusion gave rise to outrageous conduct requiring her confinement; and yet this delusion was successfully concealed for nine months, — at the end of which time it was manifested in an alarming manner. In this, and similar cases, a recovery might have been prematurely or improperly pronounced. On the other hand, it is possible for an impression, made previously to complete mental derangement, to be so firmly retained after recovery, as to have the semblance of a delusion, and yet be none; especially when no recollection is retained of what has occurred between the accession of disorder and recovery, and when the patient reasons and acts upon this conviction, and reckons a circumstance long passed as having recently taken place. Much discrimination and experience are necessary to determine when seclusion may be terminated, and the patient restored to society. If the disorder have been caused by intemperance, a longer confinement after convalescence is required, than in other circumstances; for the longer it is protracted, the greater is the chance of the patient being induced to relinquish a recurrence to the cause.

517. *h. After the patient is restored to society*, moral and hygeienic management ought to be continued for a considerable period. Due care should be taken not to excite, or inordinately indulge, the passions and desires. Irritations of mind and body should be avoided; and all emotions which depress, equally with those which unduly stimulate the mind, ought to be evaded. Mental exertion is also injurious. The intellectual as well as the moral powers should not have too much imposed upon them. They ought, at first, to be only agreeably and gently exercised; and, as they re-acquire strength, more may be exacted from them. Travelling, agreeable society, change of scene and of air, regular and early hours of sleeping and dining, pleasant occupations, and exercise in the open air, are all of the most essential service after recovery. Of no less importance are regular and abstemious modes of living, and strict attention to the states of the digestive and excreting functions. In a word, the *predisposing* and *exciting causes* ought to be carefully avoided.

518. iv. CLASSIFICATION OF PATIENTS, AND ARRANGEMENT OF INSTITUTIONS, &c. — *A. The classification of the insane*, in both public and private asylums, is too frequently dependent upon their extent, and upon subordinate circumstances and arrangements; instead of these being made subservient to a classification, which may contribute to the safety and speedy recovery of the patients. It is difficult, and even not very requisite, were it easy, to state the classifications and arrangements which may be adopted in various circumstances. In these matters, as well as in the *organisation* and *management of these institutions*, medical knowledge, and an acquaintance with mental disorders, under the guidance of common sense, will generally enable the physician to arrive at judicious conclusions. But in all arrangements and modes of organisation, a due separation of the different classes of cases, and of convalescents, should be secured; and no asylum, public or private, should be allowed or licensed, that is not placed under the constant superintendence of a regularly educated and qualified medical practitioner, who should reside in it, and be in constant communication with its inmates. On this particular topic, much information will be obtained in many of the recent publications referred to in the *Bibliography* attached to this article. I can furnish only a brief abstract of what has been stated regarding it, by PINEL, ESQUIROL, and GEORGET.

519. *a. The classification* of lunatics is requisite, not merely for the purpose of separating such as are liable to injure themselves or others, but also with the view of permitting those to associate together, who may contribute to each other's cure. A lunatic asylum should be composed of several parts, more or less insulated. There ought to be a quarter for each sex; a division for the violent; a second for those who are tranquil; a third for those labouring under accidental disorders or complications; and a fourth for convalescents. It

is, above all, necessary to separate the sexes, the convalescents, and those who have depraved habits, and indecent manners. Divisions should also be allotted for those of melancholy feelings; for those in a state of imbecility or dementia; for the noisy and furious; and for those who are untameable, or are confined by way of punishment. It would be preferable for each division to have a court planted with trees, and a garden for the patients to walk in.

520. *b.* It is further requisite, for the convenience and safety of the patients, and to facilitate vigilant superintendence and protection, that an asylum should be built on level or slightly elevated ground; — that the cells for violent patients should be spacious, with a door and window opposite each other, and opening from without; — that they should be boarded, and not paved; furnished with a bed firmly fixed in the wall; — that all the cells should communicate with covered galleries or corridors, in which the patients may walk in bad weather, and by means of which the inspectors and servants may easily pass to different parts of the building; — that all the rooms should be warmed by pipes conveying hot water in preference to hot air; — that water should be abundantly supplied; — that the privies should be arranged so as to occasion no inconvenience to the patients; — and that there should be places appointed for a general work-room, for a common dining room, for baths, shower baths, and douches. — There should be suitable dormitories for convalescents, melancholic patients, idiots, and those who are debilitated. For others, little cells with one bed are preferable; the patients going out of them in the day-time, and associating with one another, — no companions being allowed in the night.

521. *B. The selection of the inspectors and attendants* in lunatic institutions is of great importance. Insane persons look upon the attendants as accomplices in the power which has deprived them of liberty and as inhuman jailers, view them with suspicion and hatred, and even abuse and strike them. It is often difficult to make servants understand the states of those committed to their care, so as to enable them to preserve their temper, and to act with kindness and firmness in all circumstances; and it is not easy to convince them, that the insane have the use of some of their faculties, and are often quick, observant, and cunning. Those attendants, who have been themselves insane, are generally the most careful, forbearing, and kind to those over whom they are placed. M. Esquirol has a favourable opinion of convalescents as keepers: they are compassionate to the infirmities which they have themselves so recently suffered; they aid the physician more efficiently; and their examples are encouraging to others. The attendants ought always to be sufficiently numerous, — one attendant to from eight to twelve male patients, and one to from ten to fifteen females, according to circumstances. Old military men are amongst the best keepers; for, as Dr. Conolly remarks, they keep up their own authority, and are obedient to superior orders. The physician of a lunatic asylum ought to be careful to instruct those who are to have the management of the patients. It is absolutely requisite, that a judicious arrangement of authority and subordination be established in all asylums, and that the power of the physician should be superior to all, in respect of every thing that concerns the patients.

IX. INSANITY, CONNATE; AND PUERILE IMBECILITY.

— Syn. *Idiotcy, Natural Idiotism, Congenital Privation of Intellect, Puerile Imbecility, Weakness of Mind, Silliness, Stupidity, Connate Fatuity, Primary Fatuity, Idiotism, Mental Deficiency, Original Deficiency of Understanding; Stupiditas, Vecordia, Amentia, Imbecillitas Ingenii; Fatuitas; Amentia Congenita,* Sauvages, Sagar, Vogel; *Démence innée,* Fodéré; *Idiotisme,* Pinel; *Die Spracheigenheit, Blödsinn,* Germ.; *Idiotismo,* Ital.

522. Defin. — *Deficiency, or entire privation, of intellect, appearing during infancy and childhood, depending either upon an original defect, or upon an arrest of the developement of the mental faculties.*

523. *Puerile imbecility and idiotcy* may be considered as representing two grades of primary mental deficiency. The former is that state or degree in which there is an original impairment, but not an entire want, of intellect. The latter is a more complete grade of deficiency, sometimes amounting to an absence not only of the moral and intellectual manifestations, but also of the instincts necessary to self-preservation. Between, however, this, the highest degree of idiotcy, and the slightest state of intellectual deficiency, there is every intermediate grade. Original defect of intellect should not be confounded with the imbecility, or incoherency, or fatuity, consequent upon other forms of insanity, or upon cerebral diseases, — the *Amentia acquisita* of authors; nor with senile fatuity, imbecility, or dotage, — the *Amentia senilis.* The distinction has been very properly made by Esquirol and Prichard; and most succinctly and correctly stated by Dr. Klein Grant, under the article *Amentia,* in his edition of Hooper's *Medical Dictionary.* — Original deficiency and entire want of intellect may appear unconnected with any bodily disease — may be *simple* and *uncomplicated;* or they may be *associated with* other maladies — or *complicated.* Complete idiotcy, especially, may be further associated with congenital deficiency of some organ or part, or connected with malformation, or arrest of developement, of some portion of the brain, or organ of sense.

524. i. Deficiency of Intellect appears in every grade and form until it amounts to complete idiotcy. The slighter degrees of deficiency are manifested chiefly by weakness of character and capacity, or by stupidity or deficiency of the powers of perception, or of the understanding. These grades of defect are generally not sufficient to render an individual incompetent to the management of his affairs, or to conduct himself with propriety; and are hence not considered sufficient to constitute unsoundness of mind, in its legal acceptation. But as the original defect may present every grade, from the slightest of those just mentioned to complete idiotcy, it is difficult to draw any line of demarcation between what may be considered soundness or unsoundness of mind. This line must still remain unfixed, or at best be only conventional, for no standard or criterion can possibly be established. As in consecutive impairment, or disorder, of mind, so in original deficiency of intellect, there are every

shade and degree of mental manifestation, descending, from the highest state of perfection of the human understanding, down to the lowest state of privation of intellect and of instinct; there being no break in the scale, or in the continuity of declension.

525. Deficiency of intellect begins to appear from the *first* to the *eighth* or *ninth* year of age. When it is congenital, it may manifest itself even somewhat earlier than the former period. When it arises from an arrest of the developement of the mental faculties, owing to injury or physical disease, it may not be evinced until a later period than that assigned. In this latter case, the deficiency is seldom so great as when it occurs at earlier stages, or depends upon changes that have taken place in the encephalon either previous to, or soon after, birth.

526. From what has been already stated, it is obvious that all the grades and forms of original imbecility cannot be described within moderate limits. Nor is minute description at all requisite: the works of GEORGET and ESQUIROL will furnish it, and numerous illustrations of it. I may, however, briefly observe, that imbecile persons have a limited capacity for certain actions or employments, and acquire some degree of facility in performing them. These they generally execute in a tolerable manner, whilst they are quite incapable of any other modes of exertion or occupation. Habit has a great influence on all their proceedings, and gives to many of them an appearance of regularity which may be mistaken for the result of steadiness and of higher powers. All are, however, deficient in the powers of attention and thought. They are generally timorous, often docile, weak and inconstant in purpose, and frequently irascible. The senses of some give rise to feeble and dull impressions, — of others, to more lively perceptions. Memory is strong in some; whilst in others it is weak, confined in its range to the most ordinary objects and frequently repeated ideas, or it hardly exists. They display some indications of mind, of intellectual faculties, and of feelings and affections; and they have the use of speech and of language generally in a degree proportionate to the grade of perfection of their several senses and mental powers. They show the same varieties of character, inclination, and moral propensity, as persons of stronger understanding. Left to themselves, they are careless, lazy, and filthy. At the age of puberty, they evince the animal instincts by the most offensive gestures, habits, and solitary vices. Some become subject to paroxysms of capricious violence, to hysteria, to nymphomania, or satyriasis. Many are prone to lying, pilfering, and stealing. Several lapse into melancholia, or sink in a gradual decay of physical health — frequently owing to an uncontrollable addiction to masturbation. In other circumstances, they eat and digest well, and females have the catamenia regularly. Some imbecile persons evince signs of talent in particular pursuits, particularly in music and the ruder of the imitative arts. Others have retentive memories, learn languages, and are capable of other acquirements, while, in all other respects, they are deficient in any talent, and generally in mental power. They commonly present much of the character, in manner and in the developement of mind, of infants or children. They are deficient in affection, in application to any pursuit, in the powers of comprehension, of pursuing a train of ideas, and of entering into a rational or sustained conversation. They are without energy and steadiness, and are fearful and cowardly. They are incapable of reflecting, of contriving any thing, or of accomplishing any thing.

527. ii. IDIOTCY. — *More or less complete privation of the mental faculties.*—This is the highest grade of original deficiency of intellect. In this state, the moral, the reflecting, and the intellectual manifestations are altogether wanting; and sometimes the instinctive emotions of mind are also partially or totally undeveloped. Indeed, the different states of idiotcy depend chiefly upon the extent of deficiency of this class of the mental powers. Those instinctive feelings and desires, which are the most generally bestowed on the animal creation, and which especially subserve the preservation of the individual and of the species (see *Classif.* in note to § 66.), are chiefly present, — frequently in an inordinate degree, — and are deficient only in the most extreme cases. Infants that become idiots have large or ill-formed heads, imperfect features, take the breast with difficulty, are long before their eyes follow the light, and often squint. They are puny, lean, of bad complexion, have a feeble physical developement and vital endowment, are incapable of instruction, cannot learn to walk until they are six or eight years of age, or sometimes till they attain the age of puberty. They articulate imperfectly, or learn but a few words, or are altogether incapable of articulate sounds, although they may possess the sense of hearing. When the head is very small or very large, or flattened in any direction, or much deformed, death generally takes place early, — generally long before puberty, or at any age between this epoch and the first months of existence.

528. *Idiots*, both children and adults, present not only these deformities, but all those described in the article CRANIUM. Their features are irregular and repulsive; their eyes are blinking, and deeply set; their lips are large, thick, flaccid, and relaxed; their mouths are gaping, and admit of a drivelling of the saliva; their organs of sense are imperfect — they see and hear imperfectly, or are entirely deaf and dumb. Their taste and smell are also deficient, and they eat without selection of food. If speech exist at all, it is extremely limited, and drawling or lisping, and capable of expressing only the most urgent physical wants. Their chests are narrow or contracted; their limbs ill-formed; and their gait, as well as all their movements and attempts at muscular exertion, unsteady and awkward. They are sometimes club-footed, and the muscles of the arms or legs contracted. They are commonly rachitic, or scrofulous, — often partially or generally paralytic, or subject to epileptic fits. Not only are they without the reflecting and intellectual faculties, but even their sensibility is deficient; and sensation, when excited, is scarcely followed by perception of objects or ideas. They are incapable of directing their attention to any thing. Owing to the defective state of their instinctive feelings, they appear far below the brutes in the scale of animal existence; and, as M. ESQUIROL remarks, are monsters or imperfect beings, who are destined to a speedy extinction, if the tenderness of parents, or the

compassion of others, did not prolong their existence. Yet idiots have the bodily appetites, and sexual desires, — sometimes in an inordinate degree, and repulsive manner. They often exhibit signs of premature puberty, and are generally addicted to masturbation. They are often, also, subject to anger and rage. Some display faint glimmerings of intelligence, when their notice is excited by strong impressions on their senses. They then appear to look at certain things with a vague expression of pleasure, or of curiosity: they seem to desire some objects, particularly articles of food: they occasionally indicate, by gestures or cries, objects of desire or aversion, or the pleasure or pain which they feel: they come to know the persons who habitually take care of them; but they are incapable of dressing or undressing themselves, or of the common acts of cleanliness. Others are debased to the lowest state of being, — are sometimes even unconscious of their evacuations, and incapable of commanding or restraining them; and enjoy only a vegetative existence, devoid of sensation and sensibility. Idiots of a higher grade of developement are capable of moving from place to place; but are, like machines, made to repeat the same movements: they move their arms, as if to facilitate progression; laugh mechanically; utter inarticulate sounds, as if to amuse themselves; occasionally catch a few notes of a simple tune, which they constantly repeat; and become attached to particular places and positions.

529. iii. The COMPLICATIONS of imbecility and idiotcy are chiefly those already noticed (§ 523. 528.), more particularly rickets, scrofula, general or partial palsy, epilepsy, contractions and malformations of the extremities, deficiencies of the organs of sense, goître, and, still more particularly, CRETINISM, which, in its fully developed states, is always associated with more or less absolute want of the mental powers. (See art. CRETINISM.)

530. iv. The CAUSES of imbecility and idiotcy are of importance, both in a medical and in a social point of view. — *A. The remote causes* are — 1st, Those which are referable to the parents, and which operate previously to birth; — 2dly, Those which more especially belong to the patient, and which affect him subsequently to birth. — *a. The causes which operate previously to birth* are—whatever exhausts or debilitates the parents, or renders the reproductive acts imperfect*, — as habitual debauchery, solitary vices, and drunkenness; sexual debility, or states approaching to impotency; the insalubrity of certain localities, particularly those observed to produce *cretinism* (§ 6.); the scrofulous and rickety diathesis; and the advanced age or debility of one or both parents. ESQUIROL states, that idiotcy is more common in the country — especially in mountainous districts — than in towns. He, as well as numerous other writers, insists upon the influence of violent mental emotions, and moral shocks during the early or middle months of utero-gestation. Several modern writers have affected to doubt this cause; and, as they cannot dispute the frequent occurrence of arrest of developement of the nervous system, and congenital deficiency of mental manifestations, in the children whose mothers had been thus affected during the period of their fœtal existence, yet consider the phenomena in no way connected — as coincidences merely, — and as holding no relation of cause and effect. The vulgar opinion, however, of this matter is nearer the truth; and the evidence of the arrest of developement having been produced by the mental, and the consequent physical, shock of the mother during gestation, is much more conclusive than most of the evidence usually furnished us in physiological and practical researches, or than that upon which we are constantly acting in the discharge of our professional duties. It by no means follows, that the phenomena which we cannot satisfactorily explain, should therefore not exist; or that relations, of which we cannot trace the connection conclusively, are on this account altogether wanting. Yet even here, however difficult may be the explanation, or apparently loose the connection, both the one and the other may be furnished conformably with views stated in this and other articles. It is not improbable even, that the means sometimes used to conceal pregnancy, or to procure abortion, may so affect the developement of the fœtus as to produce idiotcy. The same causes which occasion congenital and chronic DROPSY *of the Brain* (§ 283. *et seq.*), will sometimes cause more or less complete deficiency of the mental faculties. Inflammation, or tubercular disease, of the brain or of its membranes, during fœtal existence, will disturb or arrest the subsequent developement of these parts, and of their respective manifestations. Injuries of the head of the fœtus, sustained during parturition, have also produced this effect.

531. *b. The causes which operate after birth* are, chiefly, injuries of the head; diseases of the brain — particularly acute and chronic hydrocephalus; inflammations of the brain or of its membranes; convulsions; dentition; exanthematous fevers — especially when attended by cerebral affections; tubercular disease, with or without inflammation, of the encephalon; remarkable precocity in connection with a susceptible and irritable state of the constitution; and very early addiction to the vice of masturbation. This last cause is frequently productive of those states of imbecility, or slighter forms of mental deficiency, observed at advanced stages of childhood, or near the approach of puberty. To these causes may be added the use of improper coverings on the heads of infants and children, as ably illustrated by M. FOVILLE (*Deformat. du Crane result. de la Méth. de couvrier la Tête des Enfans.* Paris, 1834.).

532. *B. The pathological causes* are chiefly imperfect, deficient, or interrupted developement of the encephalon, and affecting it either partially or generally; sometimes associated with changes of the consistence and form of the brain, and not infrequently with some of the usual consequences of old or previous inflammation of the membranes — particularly the arachnoid, and of the cerebral structure. MORGAGNI and others found the brain harder than natural. MECKEL says that

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* A physician was consulted by a gentleman who was anxious to marry, to secure a fortune in his family, but had been some time deterred from marriage by a consciousness of weakened sexual powers, consequent upon masturbation in early life. As he was young, and his constitution had apparently not suffered seriously, he was advised to marry, under the conviction that a moderate exercise of the sexual functions would assist in restoring their energies. The advice was adopted; but the first child that was born was an idiot. The later children were sound: he had gradually recovered his powers.

it is often drier, lighter, and more friable than usual. MALACARNE states, that the convolutions of the brain are numerous in proportion to the intelligence, and that in idiots they are always few. They are very generally smaller, less prominent, and less numerous in these persons, than in others. M. ESQUIROL has observed the lateral ventricles uniformly very small in idiots. In some, one hemisphere is much less developed than the other; and, occasionally, one lobe is more deficient than the rest. In these cases, one or more limbs have been paralysed. — These deficiencies have been more frequently observed in the anterior, than in the other lobes. The cerebral substance is sometimes softened in one part, and hardened in another. For further details, see the articles BRAIN, CRANIUM, and EPILEPSY.

533. v. The TREATMENT of imbecility and idiotcy is rather *preventive* than *curative*. — *Prevention* depends entirely upon the avoidance of the remote causes, and upon the employment of those means which tend to strengthen the physical powers of the parents, and of the offspring after birth. That much is owing to the constitutional powers of the parents, is shown by numerous facts, and by the circumstance of several idiots or imbecile persons being often met with in one family. Attention to the general health of the infant, good nursing, daily cold ablutions, frictions of the surface, a dry and temperate atmosphere, frequent changes of air, and due promotion of the several secretions and excretions, are the chief means by which a healthy developement of the offspring of debilitated persons can be secured. In every case, a strong, healthy, and young wet-nurse should be procured immediately for the infants of such parents. As dentition and childhood approach and advance, the means and the cares advised in the articles AGE and DENTITION are especially required. — The *curative means* are limited to physical and moral education, which may be of use in the slightest forms of imbecility, but which are of no avail in the more manifest states, and in idiotcy.

X. INSANITY, PUERPERAL. — SYN. *Insania Puerperarum, Mania Puerperalis*; *Puerperal Mania.*

534. DEFIN. — *Disorder or aberration of mind, of either a partial or general form, occurring in any period of the puerperal states.*

535. i. DESCRIPTION. — *Puerperal insanity* may appear in a slight or partial, or in a severe and general, form. It most frequently, however, assumes the form of mania, and melancholia. In a few cases it presents a mixed character, or that of melancholia alternating with mania. Insanity may occur — 1st, At any time from conception to parturition — the insanity of pregnancy — *Insania gravidarum*; — 2dly, From parturition to about three weeks or a month subsequently — the insanity of parturition — *Insania post partum*; — 3dly, At any period during lactation, or soon after weaning — the insanity of lactation — *Insania lactantium.* In the *first* of these periods, it is usually slight or partial, chiefly affecting either the moral manifestations or the understanding. In the *second*, it most frequently assumes the form of acute mania,—sometimes passing into a chronic state,—but rarely assuming the character of dementia or fatuity. In the *third*, melancholia, slighter forms of mania, and partial insanity are the most common. — Any of these states of disorder, occurring in any of the *periods* now specified, may be *simple*, or *complicated*, in respect of succession, or co-existence, with some other malady — particularly *hysteric affections, epilepsy, convulsions, catalepsy* and *cataleptic ecstacy, uterine hæmorrhage, disease of the uterus or ovaria.*

536. *A. Insanity during Pregnancy — Insania Gravidarum.* — Pregnancy generally occasions more or less excitement of the nervous and vascular systems; and sometimes gives rise to various morbid impulses or aberrations of mind — especially in females hereditarily predisposed to insanity. The mental disorder may appear immediately upon conception, and disappear on quickening; or it may occur at any period of utero-gestation, continue through, and cease upon, delivery; or it may persist through all the circumstances consequent upon parturition. In this latter case, however, it seldom retains the same form or character, but passes into one more general or severe; melancholia, or any other partial disorder, being aggravated into mania. In some cases, the mental affection commences as hysteria, or in some one or other of its numerous states; and in two cases in which I was consulted, it was preceded by catalepsy and cataleptic ecstacy — affections intimately allied to hysteria.

537. The most frequent states of mental disorder observed in this period are *melancholia*, and the *moral disorders* described above (§ 69. *et seq.*). The singular feelings and desires — the whims and caprices — frequently attending this state, cannot be considered as amounting to insanity, inasmuch as they seldom engross the mind, or withdraw it from all other thoughts and pursuits, or overwhelm the natural feelings, or influence the conduct. As soon, however, as any singular desire exercises such a sway as this, — when it engages the mind and influences the conduct, uncontrolled by natural sentiments and requisite occupations, — it then amounts to moral insanity, and requires both moral and physical treatment. In some females, pregnancy occasions not only irrepressible fears and melancholia, but also various disordered impulses, productive of crime or various unlawful acts, either before the control of reason can be exercised, or in opposition to the feeble efforts of the understanding (§ 92.). In unmarried females, the melancholic feelings, the irrepressible fears, and the morbid impulses of the mind, are often heightened by shame, remorse, the abandonment of the seducer, the consciousness of poverty, or the fears of ill-treatment. Under such affliction, the mind may be so disordered as to perpetrate various crimes, or even suicide. In this state, consciousness may be lost for a time, and acts be committed, before it be restored, of the most flagrant nature, and the most repulsive to the natural disposition and feelings. This is the more likely to occur, if the mental distress be attended by fits of *leipothymia*, or of *fainting*, or by *convulsions*. In some cases, recovery from these attacks, or the restoration of consciousness, is attended by a short period of maniacal excitement, or a state of momentary delirium, during which suicide, murder, or incendiarism, has been perpetrated. In most cases of mental disorder occurring during pregnancy, and

in all that I have seen, there was either an hereditary predisposition to it, or the patient had been previously subject to obstinate hysterical affections, and had experienced overwhelming or intense emotions of the mind.

538. *B. Insanity after Delivery* — *Insania post Partum* — *Paraphrosyne Puerperarum*, SAUVAGES. — *a.* Insanity consequent upon parturition is often preceded, during pregnancy, by harassing fears, and unfavourable presentiments. In some cases, various hysterical affections, preternatural susceptibility, great exuberance or depression of spirits, suspicions, irritability, a state of stupor or sopor, and slight or short attacks of mental aberration, have occurred during gestation. Generally the disease appears from the second or third day to the sixteenth or seventeenth; but it may occur almost immediately after parturition, or be delayed to the third or fourth week. Some writers assign the third and fourth, and the thirteenth, fourteenth, and fifteenth days, as the most frequent periods of its appearance. The chance of an attack, however, progressively diminishes after the third or fourth day. The disorder may commence with want of sleep, inquietude, sadness, anxiety, or ill-grounded fears respecting some matter; the phenomena of mania, or profound melancholia, supervening upon these symptoms. Sometimes an explosion of mania takes place more or less suddenly; but more frequently the patient's manner becomes quick, the temper irritable, and the nights restless, for two or three days before the attack. The form of the mental disorder varies remarkably; but the maniacal states are the most common. Next to these are melancholia, and diversified forms of monomania. During either of these disorders, and in melancholia especially, suicide may be attempted or committed. Mania may alternate with melancholia, and this last with other varieties of partial insanity. At first, and particularly in cases occurring soon after delivery, the disorder is maniacal. Sometimes the patient evinces a childish disposition for harmless mischief; is gay and joyous; laughs, sings, and talks loud and long, occasionally obscenely, and is careless of the infant and of every thing about her. She is often also suspicious; imagines every thing poisoned; and is busy with some idea, illusion, or some fancied object. In other cases, the maniacal excitement is much more intense; and the conversation and conduct more violent. These states may pass into melancholia, but very rarely into dementia or fatuity.

539. *b. The physical symptoms* are referrible chiefly to the digestive organs, and to the nervous system. The *bowels* are torpid, the secretions and excretions impaired and morbid; the stools are unhealthy, and generally very dark and offensive; and, from inattention or obstinacy, sometimes passed without regard to the natural calls. The *tongue* is moist, white, furred, or loaded; and as the disease proceeds, it sometimes becomes brownish, — mucous sordes accumulating on the teeth and lips. There is little or no appetite, and rarely much thirst. The *pulse* is frequent, small, weak, compressible; and sometimes it is but little, or not at all, accelerated, or it becomes less frequent as the disease proceeds. The *skin* is relaxed and moist, particularly about the neck, and generally cool, especially on the extremities. The head is often hot, or is warmer than usual, but the heat is not always permanent; it frequently occurs at intervals, and is sometimes greatest when the rest of the body is cool. Occasionally the scalp is cool throughout. *The general heat* of the body is rarely increased, unless when the disease is coincident with the first secretion of milk, or with inflammation of the breasts, or unless when caused by the violent exertions of the patient. Pain, sense of pressure, or tightness, of the *head*, is often felt, with uneasiness of the scalp, noises in the ears, and sometimes throbbings of the temporal arteries. There is little or no *sleep*. The *face* is generally pale, unless when the maniacal excitement is great, and then it is often flushed or turgid. The eyes are vivid or slightly red; but both they and the face are occasionally pale, although the patient is most violent. The *abdomen* is usually soft, cool, and free from pain on pressure, unless sometimes in the hypogastric and iliac regions. The *breasts* are generally flaccid, and the secretion of milk either impaired or arrested; but the milk, in some instances, is not materially diminished, although it is generally deficient in its healthy and nutritive properties. The *lochia* are often deficient, but they are sometimes abundant or offensive.

540. *c.* The insanity of females recently delivered, commonly assumes the form now described; but its character varies remarkably: in some cases, it nearly resembles *sub-acute phrenitis*, delirium supervening, as in the form of the disorder described by Dr. J. BURNS, in which the symptoms of morbid vascular action in the encephalon precede the mental disorder. In other instances, the insanity verges in its character towards *low nervous fever*: it is then generally preceded by watchfulness, fever, the supine posture, heat of scalp, and injection of the conjunctiva. Images or illusions supervene, the ideas become rapid, and the delirium, passing into a muttering delirium, is soon confirmed. The pulse is quick, and the milk and lochia are usually suspended. Enough has been stated to show that, as regards puerperal insanity, as well as many other maladies, the marked lines of demarcation attempted to be drawn by authors and nosologists do not exist in nature; but that there is a gradual approximation of character observed in this, to other diseases of the nervous system, — that the transition from puerperal insanity to phrenitis on the one hand, and nervous fever on the other, is often manifest; cases occurring in practice of an intermediate nature, and referrible to one malady as much as to another.

541. *C. Insanity during or after Lactation* — *Insania Lactantium* — *Mania Lactea*, SAUVAGES — is generally gradual in its approach; or it is preceded by symptoms premonitory of its occurrence. When, however, violent impressions are made upon the mind, or the secretion of the milk is suddenly disturbed, the disorder may burst forth unexpectedly. Generally, however, a change of temper or disposition is remarked for some time previously. The manner becomes hurried, sleep disturbed, the temper irritable, the countenance suspicious or distrustful, and the patient voluble and negligent of her infant. At length, sleeplessness, incoherence, or violence of language and conduct, and delusions, supervene. Occasionally, various hysterical and cataleptic symptoms are associated with these; and sometimes acts of violence, or attempts at suicide, are perpetrated, even

before the nature of the malady is suspected by her friends. The disease may occur at any period of lactation; but it is more frequent on weaning, or very soon afterwards, than at any other time. The melancholic and monomaniacal forms of insanity are oftener observed during this period, than violent mania: and when the latter occurs, it is apt to pass into melancholia, or to alternate with it. Insanity during this and the preceding periods may present some one or other of the *complications* noticed above (§ 166. *et seq.*).

542. ii. DIAGNOSIS.—The diagnosis of puerperal insanity is sometimes difficult, especially after delivery. Some modern writers have endeavoured to point out differences, rather than to describe the relations, really subsisting between it and other diseases, especially *phrenitis* and low *nervous fever*. But, as I have already stated, the transition of the one into the other, is not infrequent; or, the pathological condition of these maladies are very nearly the same in many cases. The absence of fever has been considered as particularly characteristic of puerperal insanity; but fever accompanies a considerable proportion of cases, especially those commencing about the fourth or fifth day, when the secretion of milk excites, some degree of febrile commotion in the system; and, at a later period, when the lochia disappear. Still it is a rapidity of pulse, and an irregular determination of blood, with increase of heat about the head, rather than fever, that are more commonly observed.

543. *a.* In *phrenitis*, the patient has headach, vertigo, throbbing in the temples, a beating noise in the ears, flushing of the face, injection of the conjunctiva, intolerance of light and of noise, heat of the scalp, rapid pulse, dry skin, suppression or sudden diminution of the milk and of the lochia, constipated bowels, and scanty and high-coloured urine, before delirium appears; and very frequently these symptoms are ushered in with chills or rigors. In proportion as these phenomena are manifested before the mental disorder appears, the disease may be viewed as possessing an inflammatory character. Puerperal phrenitis, moreover, soon passes into stupor, coma, subsultus of the tendons, catchings in the limbs, and unconscious evacuations; and often terminates unfavourably as early as the third, fourth, or fifth day, and rarely passes the eighth; whereas, puerperal mania, even in the most febrile and unfavourable cases, generally is prolonged beyond this period, unless very injudiciously treated. In the former, the physical disease is manifest and developed before the delirium appears, and is evidently the cause of it; in the latter, the mental disorder is coetaneous with, or even previous to, the physical disturbance.

544. *b.* When *low nervous fever* occurs after delivery, or during lactation, it will hardly be confounded with this disorder, as the febrile commotion precedes mental disturbance for several days; muscular power is prostrated, the patient preserving the supine posture, or being incapable of continuing any other; the pupils are but little sensible to light; the tongue is tremulous; the patient is sleepless, and complains of confusion and giddiness, rather than of pain of head; and when delirium supervenes, it is of an incoherent and muttering kind, and very rarely violent, or attended by muscular exertion. The pulse is very quick, and small; the bowels are readily moved; and the lochia or milk is suppressed. As the malady proceeds, coma, startings of the tendons, pickings of the bedclothes, unconscious evacuations, and the usual phenomena of nervous exhaustion terminate life.

545. These maladies the discriminating physician will never confound with true puerperal mania; and he will carefully distinguish such cases as present an intermediate form between either of them, and the latter disorder. He will, moreover, keep in recollection the circumstance of these diseases frequently leaving, as the physical disorder subsides, more or less of mental disturbance behind them, which may assume the form of chronic mania, or melancholia; and the risk of this result will be great in proportion to the evidence of an hereditary predisposition to insanity, and to the nervous or melancholic temperament of the patient.

546. *c. The relation of puerperal insanity to delirium tremens* has not been adverted to by writers, although the connection is obvious in many instances, and of practical importance. I have been called to several cases, which, in their remote causes, and essential features, were instances rather of delirium tremens occurring in the puerperal state, than true puerperal insanity. In some cases, the tremor is hardly to be observed, or is present only for a short time; and yet, the affection presents the other characters of that disorder, and has arisen chiefly from the abuse of intoxicating liquors. Puerperal insanity, attended by tremor, usually appears soon after delivery, and is to be imputed chiefly to the effect produced on the system, already injured by excesses, by the shock of parturition, by the consequent evacuations, and by the abstraction of accustomed stimuli.

547. iii. PROGNOSIS.—Opinions of the result of puerperal insanity were either stated in too favourable terms, or imperfectly ascertained, previously to the appearance of the works of ESQUIROL, HASLAM, BURROWS, and GOOCH. M. ESQUIROL states that, of 92 cases, 53 recovered, and 6 died,—leaving 31, or 1 in 3, as incurable. Of 85 cases, admitted at Bethlem, Dr. HASLAM observed 50 recover, and 35 incurable. Dr. BURROWS mentions 57 cases, of which 37 recovered,—28 within the first six months; 10 died, 1 committed suicide, and 11 remained uncured. Dr. GOOCH observes, that these statements present a prospect unnecessarily gloomy and discouraging; for, of the many patients, about whom he had been consulted, he knows only two, who are now, after many years, disordered in mind,—and of them, one had already been so before her marriage. It should, however, be recollected, that only the more obstinate and severe cases are sent to asylums, and not until medical treatment had been already employed; hence the more unfavourable results furnished by ESQUIROL, HASLAM, and BURROWS. Of those not sent to such institutions, a much greater proportion, than that assigned by these writers, recover, under judicious management, particularly of the non-febrile form of the malady, which is fortunately the most common. Cases attended by much febrile action, more especially those approaching either to the character of phrenitis on the one hand, or to that of nervous fever on the other, are attended by more danger; and frequently either terminate fatally, or in per-

manent insanity, — particularly if an hereditary predisposition to insanity exists. Of the 10 cases which ended in death, out of 57, recorded by Dr. BURROWS, 7 occurred within twelve days, 2 within seven weeks, and 1 after four months. Two had active uterine disease, and 2 others died in consequence of relapses.

548. The *causes* have a considerable influence on the result. Of the cases which I have seen in the Queen's Lying-in Hospital, and to which I have been called in private practice, a much larger proportion of incurable and fatal cases has existed amongst the unmarried, than in the married. Previous distress of mind is sufficient to account for these results. Of the cases of married females, that have occurred in the above Institution, since I became consulting physician to it (1822), two were represented to me by the matrons as having been caused by remorse, consequent upon incestuous intercourse; and both these terminated fatally. It may be inferred, from the results observed by several practitioners, that about four patients in five recover their intellects, and that about one in eight die, generally within the first month of the disease, the greater number within a fortnight. The proportion, however, of unfavourable cases, is manifestly greater than this, in unmarried females. The chief danger in this disease, especially in the more pure, or non-febrile, form of it, arises from debility and exhaustion of nervous power. And this is the more to be dreaded, when the disorder follows hæmorrhage, or improper bleeding, when the pulse is very rapid, weak, or small, or fluttering; and when there are great restlessness, and long-continued want of sleep. Recovery is generally more likely to take place, the more remote the attack from the period of parturition, or when the disorder occurs during lactation. The appearance of the disease during pregnancy should lead the physician to anticipate a severe form of it after delivery. Moral causes, also, give rise to more severe and dangerous attacks, than physical causes; and the maniacal form terminates favourably more frequently, and in a shorter time, than the melancholic, in as far as the recovery of reason is concerned; but deaths are more likely to occur in it, — at least, after a short period from the attack. Of 55 recoveries, M. ESQUIROL states, that 38 took place within the first six months. Of 35 recoveries, recorded by Dr. BURROWS, 28 occurred within the same period. When the delirium is of a gay character, and the patient sings, laughs, talks wildly, and is a little mischievous, it rarely lasts long; but when it is attended by great suspicion, apprehension of poison, and sullenness, or when suicide is meditated or attempted, it then assumes a more serious character, and is not soon cured. Upon the whole, this disorder requires a very cautious and guarded prognosis.

549. iv. CAUSES. — *A.* The *predisposing causes* of puerperal insanity are nearly the same as favour the occurrence of other forms of mental disorder,— the puerperal states being superadded causes of predisposition to these, and the period immediately following delivery being the most influential of these states. Hereditary influence, constitutional debility, and susceptibility of the nervous system, most powerfully co-operate with the puerperal states. Of the 92 cases noticed by ESQUIROL, 16 were attacked from the first to the fourth day; 21, from the fourth to the fifteenth day; 17, from the sixteenth to the sixtieth day; 19, from the sixtieth to the twelfth month of lactation; and 19, after forced or voluntary weaning. Dr. BURROWS remarks, that of the 57 cases which he has observed, the disease commenced on or before the fourteenth day in 33; and after the fourteenth day, and before the twenty-eighth, in 11 instances. — As to the *age* at which the disorder most frequently occurs, he observes, that from the age of twenty to thirty it is more frequent than at any other age, in the proportion of nearly two to one. M. ESQUIROL states, that of 92 females, 22 were from twenty to twenty-five years of age; 41, from twenty-five to thirty; 16, from thirty to thirty-five; 11, from thirty-five to forty; and 2, from forty to forty-three. — The *comparative frequency* of this disease in married and unmarried females has not been duly attended to. Nearly one third of the cases adduced by M. ESQUIROL were those of unmarried women; whilst a fourteenth only of those observed by Dr. BURROWS were unmarried. There can be no doubt, that the disease is, relatively to the number of pregnant single women, much more common in them than in the married. This is to be imputed to the more general and intense operation of the moral exciting causes on the former than on the latter. M. ESQUIROL imputes the frequency of this malady, in the unmarried, in great measure, to the influence of suppression of the lacteal secretion, and premature weaning, — comparatively few unmarried females suckling their children. In this country, however, the majority of them find situations as wet-nurses. Females who have been subject to *hysteria*, particularly its more severe and obstinate forms, previously to pregnancy, are very liable to puerperal mania; and those who have been once attacked, are highly predisposed to the disease on each successive return of the puerperal states. Of the predisposition arising out of hysteria, I have met with several remarkable instances. Some writers have remarked, that nearly one half of the cases, which they have treated, have, more or less, depended upon hereditary predisposition. Of the instances, which I have seen in the lower classes, a large proportion has occurred in those who had been addicted to the inordinate use of spirituous or malt liquors.

550. *B.* The *exciting causes* are also very frequently the same as produce mental disorders in other circumstances; although there are others, which especially belong to the puerperal states, or which produce their effect chiefly in these states. There are some, also, of a physical or pathological kind, consisting of changes in the sexual organs and nervous system, connected with impregnation, parturition, and lactation. The most common exciting causes are, moral emotions, and errors of diet and regimen. Of the latter, improper food, stimulating or heating articles, exposure to cold air or currents of air, damp clothes, the evaporation of liquid perfumes, the suppression of the lochia or of the milk, premature exertion, the use of cold fluids, and neglect of the abdominal secretions and excretions.

551. *Moral emotions* have a remarkable effect upon both the nervous system and the secretions, during the puerperal states — great in proportion to the nearness of their occurrence to the period of delivery. The comparative influence of the

moral causes has been attempted to be estimated by M. ESQUIROL and Dr. BURROWS; but the application of numbers to the estimation of the separate value of individual influences, in the production of disease, especially as diversified combinations of both exciting and predisposing causes generally occasion it, leads rather to erroneous than to correct conclusions; and is, at best, a parade of accuracy, in respect of matters which admit only of approximations to the truth. Besides, the relative influence of particular causes vary with the age, constitution, modes of living, previous health, and occupations of the patient; and with seasons, weather, epidemic states of the air; and with climate, situation, and peculiar circumstances of the country. M. ESQUIROL states, that 46 of 92 cases of puerperal insanity were caused by moral emotions, whilst Dr. BURROWS estimates the physical as being ten times more influential than the moral causes. My observations lead me to infer, that M. ESQUIROL is very much nearer the truth, even allowing hereditary predisposition, which exists in a very large proportion of cases, to be a physical cause.— The most frequent moral emotions are those which have been already noticed (§ 549.) as operating chiefly on the minds of the unmarried; also fright, fear, anxiety, chagrin, anger, domestic dissentions, grief at the desertion of the father, or at the death of the infant; dread of the malady after having experienced an attack, &c. The influence of terror and fear was shown by the cases which came under the care of M. ESQUIROL, in 1814, and 1815. Of 13, which he admitted in the former year, 11 were caused by fear. A sudden shock, or whatever startles or alarms the patient, as a sudden clap of thunder, will often occasion the disease, especially soon after parturition. The abuse of intoxicating liquors exerts both an exciting and a predisposing influence; and it has not only a direct, but also an indirect, effect. These liquors either excite the malady by immediately stimulating the nervous and vascular systems, at periods when susceptibility is augmented and vital power impaired; or, in other cases, they indirectly cause it, by the sudden abstraction of the accustomed excitement they have afforded, at a time when the frame is depressed by the suffering and by the evacuations attending parturition. When puerperal insanity proceeds from this source, it may either assume more or less of the characters of delirium tremens (§ 546.), or vary but little from its usual forms. In order that the treatment should be successful, care ought to be taken to ascertain the existence or non-existence of this cause from the attendants most competent to furnish the information.

552. v. PATHOLOGICAL STATES. — *A. The appearances observed after death,* caused by pure or true puerperal insanity, particularly when it occurs soon after delivery, or during suckling, consist chiefly of deficiency of blood in the brain and its membranes; and, in some instances, of slight effusions of serum between the membranes, and in the ventricles. There are no signs of inflammation, or even of congestion, excepting in such cases as have approached in their characters to phrenitis on the one hand, or to nervous fever on the other; and in these, appearances of an inflammatory or of a congestive nature, with or without effusions of serum, are often observed. The pure cases of the malady present little beside anæmia of the brain and its membranes, and of the system generally. Morbid changes in other parts of the body, or even in the sexual organs, are coincidences or accidents only.

553. *B. The morbid condition more immediately occasioning the malady* seems to consist of increased nervous susceptibility and greatly impaired power, frequently associated with deficiency of blood. The balance of the circulation is also often disturbed, and irregular determinations of it take place, especially to the brain, and to the uterus. Whilst the circulation is more active in one quarter, it is deficient in others, and the functions of the brain are thus directly or sympathetically disordered. — After impregnation, the organic nervous influence of the uterus and ovaria is more or less developed and exalted, and the excitement of these organs often extends to, or reacts upon, the cerebro-spinal nervous system, and its manifestations, exciting and disordering it and its functions. After delivery, the susceptibility of the brain, and of the nervous system generally, is increased, and the disposition of these to be sympathetically affected by the states of the mammæ, uterus, and ovaria proportionately augmented, — the susceptibility being great in proportion to the shock which the system has sustained from the parturient process, and to the loss of blood and exhaustion. The occurrence of the disease during lactation is to be imputed chiefly to exhaustion, debility, and vascular inanition; and its appearance after weaning, to a disturbance of the balance of the circulation,— a greater determination of blood taking place to the brain than to other parts, upon the cessation of the secretion of milk, as well as upon the premature cessation of the lochia.

554. vi. TREATMENT. — *A.* Insanity occurring *during pregnancy* is generally either partial, or of short duration when it assumes a maniacal form. In either case, the treatment should chiefly depend upon the state of the vascular system as to fulness, action, and tone. When the circulation is deficient in none of these conditions, and particularly when plethora exists, a small bloodletting will then be useful; but in doubtful, or other circumstances, cold applied to the head, warm and stimulating pediluvia, refrigerants, and refrigerating diaphoretics, cooling aperients, and antispasmodics, conjoined with narcotics, as hereafter prescribed, must constitute our principal means of cure; aided, however, by judicious moral management, and by appropriate diet and regimen.

555. *B. Insanity occurring soon after parturition* requires the utmost discrimination in ascertaining—1st, the presence of the disease in its pure or unmixed character; — 2dly, those mixed states which partake either of the character of phrenitis, or of that of low nervous fever: and the greatest care in the selection of remedial agents. In this disease it is always most important to consider the state of the vascular system, in connection with nervous excitement; and to inquire as to the dependence of whatever degree of vascular action that may be present upon the condition of the nervous system, and upon the mental disorder and muscular efforts. In all cases, moreover, it should never be overlooked, that the frame has received a shock, during the parturient process, — that the nervous system has endured great excitement and suffering, — and that the vascular sys-

tem has sustained a loss sufficient in many cases seriously to disturb the healthy relation subsisting between the state of the vessels and their contents, and to disorder the balance of the circulation in different parts of the body. These considerations will generally guide the practitioner in the treatment of the more difficult, doubtful, or mixed cases: the more simple and pure instances of the disease will present neither difficulty nor doubt.

556. *a. Bloodletting*, in any mode, is most injurious in puerperal mania and melancholia, and in such cases as are attended by fever; or, where the symptoms approach those of delirium tremens. Indeed, puerperal insanity occurring in the lower classes of society, not infrequently, is very closely allied to that disorder, owing to the circumstances already noticed (§ 546. 551.). In those cases which assume the form of *nervous fever*, vascular depletion is also pernicious. Where, however, the malady approaches, in some of its features, a *phrenitic form*, — when the head is hot, the face flushed, the pulse hard or strong, and the secretions suppressed, the propriety of bloodletting might seem to be obvious; yet, even in these cases, the practice, although cautiously resorted to, might be injurious, or fail of proving beneficial. Those symptoms are sometimes fallacious; for they are occasionally produced by the violence of the nervous and mental excitement, or of the physical exertion, relatively to the power of the system, and are of short duration, — dangerous exhaustion soon supervening. In such instances, even a small bloodletting would only hasten and increase the consequent depression. In cases, which commence with headach, fever, flushing of the face and eyes, diminished secretion and excretion, and occasionally preceded by chills or rigors, and in which the mental disorder is clearly consequent upon the inflammatory and febrile symptoms, a recourse to bloodletting, and to other antiphlogistic means, is obviously requisite, for the disease is more or less inflammatory, or consists of a state of active congestion, approaching inflammation. Yet, even in these cases, the practitioner will be guided, in some measure, by the rapidity with which the mental disorder followed the physical disturbance, by the previous condition as well as the existing circumstances of the patient, by the evacuations attending and consequent upon parturition, and by the several phenomena characterising the case. Whenever the mental affection follows quickly upon the cerebral and constitutional symptoms, vascular depletions of any kind are seldom of service, unless very prudently prescribed.

557. When there are much heat of the scalp, flushing of the face, beating of the carotid arteries, and no indication of urgent debility or exhaustion, the previous condition and evacuations of the patient furnishing no sufficient reason for the existence of these states, then may leeches be applied behind the ears or around the occiput, and cold to the head, with great advantage. Whilst ice, cold lotions, &c. are placed around the shaved head, the feet and legs should be frequently bathed in warm water, to which mustard, or scraped horse-radish, has been added. In the majority of cases, where inflammation is dreaded after delivery, there is only active determination of blood to the head, the circulation in the extremities and in other parts being impaired; and in these the continued application of cold to the head, and the frequent or persevering use of derivatives to remote parts, or to such as experience an insufficient supply of blood, will generally remove the disorder. The application of blisters to the nape of the neck has been advised by many, but they are seldom of much service in the maniacal states of disorder. In the melancholic form, or when there is a tendency to stupor, rather than to high excitement, blisters on the nape, or behind the ears, are generally of use.

558. *b.* In a great proportion of cases of puerperal insanity, fæcal accumulations have formed in the alimentary canal, and morbid secretions have collected in the gall-bladder, hepatic ducts, in the cæcum, and in the cells of the colon. The existence of these collections is indicated by a loaded, foul, or furred tongue, by a fœtid breath, by a lurid or discoloured state of the skin and of the complexion, by more or less fulness in the regions of the cæcum and sigmoid flexure, and by dark and offensive evacuations. The propriety of *purgatives* in all such cases, and of *emetics* in many of them, is undoubted. The latter, however, should not be used when debility or exhaustion is extreme, — when the face is pale, the skin cold, and the pulse very quick and weak. Ipecacuanha is the best emetic in ordinary circumstances; but when vital depression is considerable, any of the warmer emetics prescribed in the *Appendix* (F. 402, 403.) may be used. After its operation, calomel may be given with camphor and some cathartic extract, and a few hours subsequently a draught, with rhubarb and magnesia, or any other purgative, may be taken. The full operation of these upon the bowels should be secured either by their repetition, or by the administration of enemata, and especially of those containing castor oil and spirits of turpentine. In most cases, the stomachic aperient, consisting chiefly of the compound infusions of gentian and senna (F. 266.), or the compound aloetic pill or decoction, will be the most appropriate medicines.

559. *c.* Having evacuated morbid secretions and fæcal collections, it is next requisite to support the constitutional powers and allay nervous excitement by *antispasmodics* or *diffusive stimulants*, conjoined with *narcotics* or *sedatives*. Where debility, exhaustion, or vascular inanition, is urgent, it will generally be necessary either to combine restoratives or stimulants with alvine evacuants, where the latter are requisite, or to give the former in the intervals between their exhibition. — *Narcotics* are more beneficial in puerperal, than in any other form of insanity, particularly when conjoined with camphor, ammonia, or aromatics. Since 1815, I have usually prescribed five grains of the extract of *hyoscyamus* with an equal quantity of *camphor*, in the morning and afternoon, and double this quantity of each at bed-time. Where there are much heat of the head, flushing of the face, and thirst, these symptoms should be removed by cold applications, purgatives, refrigerants, and external derivatives, before camphor or ammonia is exhibited; but notwithstanding their presence, in a moderate degree, the camphor and hyoscyamus may be exhibited, provided that these means are persisted in, and the enemata already advised are occasionally administered. In still more urgent cases, the camphor may be given

more frequently, conjoined either with hyoscyamus or with *opium* or *morphia*, — a larger dose being given shortly before bed-time. I have rarely found the following draught to fail in giving repose, and in contributing to the clearing up of the mind subsequently, when prescribed after the requisite alvine evacuations, and when the head is kept cool, and the lower extremities warm: the enema has also proved very generally of service.

No. 277. ℞ Morphiæ Acetatis gr. ⅓; Liquoris Ammoniæ Acetatis ʒ jss.; Mist. Camphoræ ℥ j.; Acidi Acetici ♏ vj.; Spiritûs Lavand. Comp., Spir. Myristicæ, Spir. Rosmarini, āā ʒ ss.; Syrupi Papaveris ʒ j. M. Fiat Haustus, horâ somni sumendus.

No. 278. ℞ Camphoræ rasæ gr. x.; Assafœtidæ ʒ ss—ʒ j.: Extr. Rutæ ʒ ss.; tere cum Olei Terebinthinæ ℥ j.; Olei Ricini ℥ j. (vel Olei Olivæ ℥ iij.); Decocti Avenæ ℥ x. ad ℥ xiv.; Syrupi Papaveris ʒ ij. ad ℥ ss. Fiat Enema, pro re natâ injiciendum.

560. *d.* It is important *to administer due support to the system during the treatment of the disease*, more especially when there is neither a febrile state of the pulse, nor heat of the head or surface; and this support, whether *medicinal* or *dietetical*, should have due reference to the previous modes of living and habits of the patient. When puerperal insanity becomes chronic, or when it appears in the course of suckling, and particularly when there is a total absence of inflammatory or febrile symptoms, *tonics* — especially the infusion or decoction of *cinchona*, or any of the *bitter infusions*— may then be given with *ammonia* and *aromatics*; the secretions and excretions being promoted by the usual means; change of air and of scene, and appropriate moral treatment, being brought in aid of the physical remedies. When the patient has been addicted to the use of intoxicating liquors, and especially if the disease assume a form approaching to delirium tremens, then *opium* with *camphor* or with *ammonia* should be freely administered. *Brandy* or *wine* may be given in arrow-root; or even *warm, spiced,* or *mulled, wine,* or *ale*, may be occasionally allowed.

561. *e.* The *diet* requires much attention. Drs. Prichard and Gooch remark that patients incur some risk of being starved in this disease, through the mistaken notions of their attendants, who are apt to consider the excitement of the malady a reason for withholding food; when this very state, owing to the exhaustion often produced by it, renders due support especially necessary. Farinaceous fluids of a nutritive quality, as rice, arrow-root, sago, &c., should be given at short intervals, when febrile symptoms preclude the use of animal food. Warm milk, or broth, may also be allowed, but should be taken in small quantity at one time. In protracted cases, solid meat, malt liquor, wine and water, bottled porter, or the bitter ale usually sent to India, will often be of service. Patients who have been accustomed to live fully, and to the use of stimulating liquors, must be allowed such food and beverages as their physical symptoms will permit, without reference to the state of the mental disorder. When suckling is concerned in producing, heightening, or perpetuating the mental affection, by draining an already weakened constitution, a nurse must be procured, and a nutritious and tonic diet and regimen prescribed, with change of air, and the use of chalybeate waters.

562. *C.* When *insanity appears during suckling*, the treatment is nearly the same as that just described. A nutritious and cordial *diet* should be immediately allowed; and meat taken daily, with about four ounces of wine. Purging in such cases is injurious, but the bowels should be kept in a regular state by the compound decoction of aloes, or by the infusions of gentian and senna. If the mental disease occur after sudden weaning, and particularly if it assume a maniacal form, and if there be any reason to infer that an inflammatory affection of the brain has supervened upon the sudden suppression of the milk — if the symptoms already mentioned, as indicating this state, appear, then appropriate means should be prescribed; but this is not to be determined, nor is the treatment to be regulated, by the disorder of the mind, but by the bodily symptoms.

563. When the *milk* becomes scanty, or ceases to be secreted, and the mental disorder seems to be aggravated by this circumstance, or has supervened upon it, the secretion should be encouraged by keeping the child to the breast.—If the *lochia* disappear prematurely, means should be taken to procure its return. For this purpose, the warm bath, the semicupium, or the hip bath, may be used; and, if these fail, leeches may be applied on the insides of the thighs, near to the groins, and the hip bath be subsequently employed. Warm fomentations may also be applied to the pudenda, or over the pubes. At the same time, cold applications around the shaved scalp ought to be assiduously employed.

564. The *constant attendants* on the patient should control her mildly but effectually, not irritate her, but protect her from self-injury. Servants or monthly nurses can seldom do this; they ought, therefore, to be removed, and a nurse accustomed to the care of deranged females placed in their stead. The patient should never be left alone; and every thing with which self-injury can be effected should be carefully removed. The windows ought also to be secured. The husband or near relations ought never to be left alone with the patient, but should be excluded until the state of the disorder permits their admission. It is generally necessary to remove all persons who are sources of excitement of any kind. Seclusion in some mode or other — partial or complete — is generally necessary, — at least, for some time. There is often, however, great difficulty in carrying this into effect, in such a way as will tend to the comfort and speedy recovery of the patient. Removal to an asylum is not so frequently requisite for the mental disorders of puerperal patients, as for insanity occurring in other circumstances. It is principally required in the more obstinate and prolonged cases; and after other measures of partial or complete seclusion have been tried. Dr. Gooch remarks, that, where seclusion has been adopted, there may come a time, at which some interruption to this solitary life may be advisable. When the disease has lasted long, when the patient expresses a strong wish to see some near friend, when she entertains illusions which the sight of some one may efface, the admission of such person should be tried. It is well observed by Dr. Haslam (*Moral Management of the Insane*, p. 14.), that confinement is too indiscriminately recommended and persisted in. An intercourse with the world has dispelled, in many instances, those hallucinations, which a protracted seclusion, in all pro-

bability, would have added to and confirmed. In its passive state, insanity has been often known to wear off, by permitting the patient to enjoy her liberty, and to return to her usual occupations and habits. There is obviously a period of the malady approaching convalescence, in which the bodily disease is loosening its hold over the mental faculties, and in which the latter are capable of being drawn out of the former by judicious appeals to the mind, and by a salutary moral management.

XI. SUICIDAL INSANITY. SYN. — SUICIDE — SELF-HOMICIDE; *Suicidium, Autochiria; Melancholia Suicidium; Selbstmord*, Germ.; *Le Suicide*, Fr.; *Suicidio, Suicida*, Ital.

565. Under *suicidal insanity I proceed to consider self-destruction or self-homicide, whether it be seriously entertained, or attempted, or perpetrated.*

566. The religion, the laws, and the manners of a people contribute in a remarkable degree to the opinions entertained respecting suicide, and to the frequency of it among them. Of the influence of the laws on self-destruction, sufficient proofs have been furnished in recent times; and the restraints formerly imposed by them, upon minds insufficiently influenced by rational views of religion, being now in a great measure removed, this crime has become much more common, and has assumed an importance equally great, in a moral and social, as in a strictly medical, point of view.

567. The *Ancients*, in general, condemned suicide, unless on occasions calculated to benefit the common weal. Several stoical writers, however, attempted to justify it by reasoning and by their examples, whilst the opinions of others respecting it were either contradictory or insufficiently expressed. *Legislation* regarding it was formerly, and still remains, very different in different countries; it being in some places allowed by the laws, in others tolerated only in certain circumstances, and in some condemned as a crime. The *Christian religion*, of whatever sect, and the doctrines of the Koran, regard it amongst the greatest of sins; whilst it is permitted, or even encouraged, by numerous pagan rites. At the present day, the *opinion* *, by no means generally received, although very commonly acted upon in this country, that suicide is always an insane act, leaves every member of the community at liberty, without any degrading penalty attached to the act, to dispose of his own life as he pleases, without reference to the claims of those depending upon him, or of society in general. The knowledge that no indignity will result to his body, and no discredit to his memory, thus becomes an incentive to self-destruction; and, even when it is not an incentive, it cannot, at least, impose any restraint upon an impulse to commit this act, when a weak-minded person is subjected to chagrin, passion, and misery.

568. That suicide is frequently, or even generally, caused by some one or other of the numerous forms of insanity, may be admitted; but that it is thus occasioned in all cases, is not so manifest. It may be said, that it is an act of moral insanity; and, as far as immorality and passion may be viewed as temporary insanity, so far may it be considered as such. But that it alone constitutes insanity, or that, in a considerable proportion of the cases of it, — especially those wherein mental sanity has been disputed, — the mind is disordered even to the extent contended for, in respect to the forms of moral and partial insanity described above, is not so evident. That the mind is impaired, and the judgment so far weakened, as to be swayed by morbid feelings and impulses, or to be unable to withstand the suggestions of passion and chagrin, may be allowed; and, as far as a weakness of mind, permitting the impulsions of passion their full career, may be considered as insanity, so far may suicide be viewed in this light. We observe the mind of the petted and spoilt child to have the weakness and susceptibility natural to the early stages of its developement increased by the indulgence, and remark the effects produced upon it, when a desired object is withheld. In like manner, the adult mind, unexercised and imperfectly strengthened by opposition and disappointments, and pampered by enjoyment and success, experiences a sudden revulsion upon unexpected reverses or indignities, is thereby irritated as well as depressed, and accuses itself or Providence, — the impulses excited by these feelings being sometimes carried into effect before the sober dictates of reason can withstand them; or these impulses more or less quickly overthrow the efforts which reason may make. In most cases, these efforts are too feeble to counteract the impulses arising out of outraged feelings, or to subdue the sufferings of wounded self love, or the stings of injured honour. The mind, already weakened by indulgence, is the easier overwhelmed by these emotions, the more intensely feels the shock, more quickly sinks before it, and is the less capable of making an effort to recover itself, the less it is swayed by the dictates of religion and principle, and the less it is deterred by fears of any indignity, or of the reprobation of opinion. All these sentiments come in aid of the mind in adversity, or during contrarieties, when duly regulated, although weakened, and conduce to a healthy moral reaction; but they can have no influence where they have never been habitually entertained.

569. i. OCCASIONS OF SUICIDE. — *A. The exciting causes, or the circumstances determining self-destruction*, are very diversified. Whatever may be the motives or incentives to this act, they promise to the imagination something preferable to life, or a lesser evil than existence. — 1st. Suicide may be committed in circumstances, or with motives, calculated to excite admiration, or, at least, to preclude the imputation of blame; but such occasions are rare; and although not infrequently recorded in ancient history, they rarely or never occur in modern times, or in the present state of society. — 2dly. Suicide is often caused, in some countries, by religious rites or institutions, by received notions respecting injured honour, and by hopes of thereby passing into a happier state of existence. — 3dly. It is very frequently occasioned, in barbarous communities, by a species of nostalgia, by forcible removal from home, or by slavery, and by ill-usage, in connection with a belief of thereby returning to former abodes in another state of existence. — 4thly. It occurs very frequently during delirium and mania, — in consequence generally of some illusion, false percep-

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* In respect of suicide, opinion is as strong as a legislative enactment, inasmuch as it determines the coroner's jury as to their verdict, — this act being always found by them as that of insanity.

tion, or error of judgment. — 5thly. During melancholia, it is very commonly attempted; and the idea of committing it is generally entertained long before it is perpetrated. — 6thly. It is sometimes also attempted in almost all the other forms of partial insanity, and particularly those attended by depression and anxiety respecting a state of future existence, or by unsettled views of religion. — 7thly. Suicide often is suggested by the emotions consequent upon reverses, wounded self-love, chagrin, and contrarieties of all kinds; and by the violence or intensity of passion and anger: the enraged feelings, being incapable or unable to exhaust themselves upon the object which excited them, recoil upon themselves, and often thus originate a suicidal impulse, which is not always successfully resisted. — 8thly. A suicidal suggestion may arise from various circumstances of a negative or passive kind, — from satiety, from ennui, from the want of excitement, from the excess of gratification, and the exhaustion of all its sources, &c. In such circumstances, the idea may long be entertained, and, ultimately, either carried into effect, or laid aside, from a change in the mental or physical state of the individual. — 9thly. It may proceed from a mental infection or sympathy, — from the details, contained in the public caterers to the gratification of the more debased of our moral sentiments, of various modes or instances of self-destruction, — and from a desire, during states of chagrin or disappointment, of obtaining notoriety by the manner of carrying it into effect. — 10thly. It is often committed in order to avoid public exposure and ignominy, or punishment of a severe or lasting kind. — 11thly. It is more rarely had recourse to, in order to escape from violent pain, or the various miseries attending want and destitution, and from feelings of despair. — 12thly. From remorse or self-reproach. — 13thly. From a morbid or insane impulse, without any other obvious mental disorder. — 14thly. From a species of fascination, — as when looking down from great heights. — 15thly. By weak minds in a state of irritation and chagrin, in order to injure the feelings, to occasion regrets, and thereby to revenge slights or contrarieties on those who caused them. — 16thly. Suicide may be mutual and reciprocal, caused by the same feelings, and by the same or different means. — 17thly. It may follow murder. — 18thly. It may be simulated. — Certain of these require further remark.

570. *a.* The instances of self-destruction or of self-devotion caused by patriotism, or by a wish to benefit the community, or to escape dishonour, have been generally viewed as precluding blame, and as hardly deserving to be ranked as suicidal. The cases of CODRUS, of DECIUS MUS, of CURTIUS, of OTHO, of the citizens of Calais and of Rouen, may be referred to as being of this kind. ZENO and his followers inculcated, that a wise man should be ever ready to die for his country or his friends: and the Stoics in general taught, that suicide was preferable, not only to dishonour of any kind, but even to the enduring of severe pain, or lingering disease. Amongst the Greeks and Romans, self-destruction was preferred by many to subjection to a victor, or to a state of slavery. ISOCRATES, DEMOSTHENES, BRUTUS, and CATO terminated their own lives rather than fall into the hands of conquerors.

571. THEOXENA and the virgins of Macedon committed suicide to escape dishonour; and numerous instances of a similar kind have occurred in ancient and modern times. LUCRETIA would not survive the dishonour she could not prevent. LYCURGUS and CHARONDAS sacrificed their lives in order to maintain the inviolability of their own laws and institutions. Most of the above instances of suicide may be viewed as precluding blame, and some of them may claim our admiration. But other instances, committed on less laudable occasions, have been considered as excusable by MONTAIGNE, Dr. DONNE, ROUSSEAU, HUME, and others. When JOSEPHUS, who commanded the Jewish army, wished to surrender to VESPASIAN, from a conviction of the hopelessness of resistance, his soldiers insisted upon their having recourse to suicide rather than to yield to a conqueror. But he resisted their importunities, and concluded his arguments by observing that "self-murder is a crime most remote from the nature of all animals, and an instance of impiety against GOD our Creator."

572. *b.* The victims of religious rites, as in India, and in the Canaries in former ages — of national customs and manners, as in the isle of Ceos, Japan, &c. — and of ignorance — and of those persuasions which constitute a part of religious belief, also, — are not be viewed as instances of suicidal insanity, but as proofs of the influence of high moral and religious considerations and expectations, of the tyranny of custom, and of false notions of honour; and they result legitimately from the training or education of the mind from an early period of its developement. They are altogether different from the suicides which were so frequent during the decline of Roman greatness, and which proceeded chiefly from vice and licentiousness, or rather from the sentiments and impulses which are generated from these sources — sources so productive of suicide in some countries at the present time.

573. *c.* Suicide in states of *mania*, or of *delirium*, occur either from some involuntary or blind impulse, or from some delusion, hallucination, or false perception, — as when a person, in either of these states, throws up the window of his room, and walks out of it, in the persuasion of his going out at the door. Maniacs also attempt to destroy themselves at the commencement of the malady, under the influence of the moral despair which caused it; and others commit the act from the distress caused by a knowledge that the disease is approaching or is returning. A patient for whom I was consulted during an attack of mania, from which he recovered, experienced, after a time, similar symptoms to those which ushered in the former attack. His friends were directed to take the necessary precautions regarding him; but these he eluded, and committed suicide. This act is occasionally also attempted during convalescence from mania, in consequence of reflecting upon the excesses committed during the attack. It may even be accidental, owing to attempts at escaping from restraint or seclusion.

574. *d.* In *melancholia* and *monomania*, suicide is occasioned by illusions, or by the violence or intensity of some passion or sentiment, or by a sudden impulse which reason is incapable of restraining, or which induces the act before reason can be exerted, as more fully explained above

(§ 91, 92.). In some cases, the morbid impulse is partially or fully carried into effect; and either in consequence of the nature of the means of self-destruction employed, or of reason having at last come to the rescue, attempts are made by the individual himself to counteract them; these attempts either succeeding or not according to circumstances. The suicidal impulse is occasionally developed in an early stage of congestion of, or of inflammatory determination of blood to, the brain; and either previously to, or contemporaneously with, such impulse, insane delusions or acts may be manifested. If, in such cases, the means of destruction shall have the effect of removing the morbid physical condition before extinguishing life, the patient will make efforts at self-preservation. This is not infrequently the case, when suicide is attempted by dividing the vessels in the neck. When self-murder is resorted to, during melancholia, from a fear of becoming insane, and with the feeling that it is the patient's fate or destiny to commit it, the conviction is sooner or later completely verified. Indeed, when it is contemplated or attempted in any form of partial insanity, the intention is generally persevered in, although it may be variously concealed, until it is accomplished in one way or another.

575. In melancholia and other states of partial insanity, or even previously to any symptom of insanity being sufficiently prominent to attract notice, or in consequence of some mental shock or perturbation, the patient may conceive that an internal voice calls upon him to commit suicide, and may act in conformity with it; or he may entertain the idea long afterwards, either without being able to divest his mind of it, or resisting the impulse to perpetrate it with the greatest difficulty, and with the utmost exercise of his reason. A lady consulted me on account of headach, during which she could not look upon a knife without experiencing a strong desire to use it against her own life; but her reason had always resisted the impulse, which disappeared after treatment. In such cases, if medical and moral means be not appropriately employed, and often notwithstanding the aid of both, the morbid impulse is ultimately carried into effect. Amongst persons who have been but little accustomed to self-control, or to listen to the dictates of moral and religious principles, such impulses are often soon acted upon. M. Esquirol furnishes several instances. A monomaniac, he states, heard a voice within him say, "Kill thyself, kill thyself!" and he immediately obeyed the injunction. This writer remarks, that he has never known an instance of suicide from an irresistible impulse, without some secret grievance, real or imaginary, serving as motives to the suicidal propensity. There are few states of *partial insanity*, that may not be attended, or followed, by this propensity. Of the delusions which characterise melancholia, there are none more productive of self-destruction, as Dr. Darwin has remarked, than the fear of future damnation, and of present poverty.

576. *e.* Suicide may be committed under the influence of *passion*, of *violent anger*, or of *self-accusation or remorse*. When intensely excited by anger, the mind, for the time, is in a state truly maniacal; and acts of violence to others, or to the person himself, may be committed in the height of the paroxysm, according to the nature of the circumstance or occurrence causing the excitement. Suicide from this cause is most likely to be the fate of those, who have not been sufficiently taught to curb their feelings, and who have been improperly indulged in early life — as Childe Harold describes himself, —

> "My brain became,
> In its own eddy boiling, and o'erwrought,
> A whirling gulf of phantasy and flame:
> And thus untaught in youth my heart to tame,
> My springs of life were poisoned."

Remorse and self-reproach frequently lead to self-destruction, as the only mode of escaping from the enduring agonies they occasion. The passions which "madden to crime" are often followed by the most anguishing feelings of self-accusation, which not infrequently arm the hand of the sufferer against his own existence. Shakspeare has powerfully and naturally illustrated this state of mind in his delineation of the character of Othello. The victim of remorse is often haunted by dreams, from which he awakens in a state of frenzy, or of delirium, in which attempts at suicide are sometimes fully carried into effect; and in his waking hours his mind is haunted by recollections which become his domestic Furies, and lash him on to madness. "Sua quemque fraus," says Cicero, "et suus terror maxime vexat; suum quemque scelus agitat, amentiâque afficit; suæ malæ cogitationes conscientiæque animi terrent. Hæ sunt impiis assiduæ domesticæque Furiæ." But, whilst remorse thus leads to suicide, by at first more or less obviously disordering the mind, this act as frequently is the proximate result of the moral sentiment; the attempt, or the commission of it, being preceded by no other morbid manifestation of mind than the moral torture proceeding from the consciousness of having committed a crime, great either in itself or in relation to the various circumstances connected with it.

577. *f. Reverses, mortified pride,* impatience under misfortune, and *disappointments*, are frequent causes of suicide, especially in commercial countries, and under free governments, where there is a constant straining, amongst the more educated classes, after wealth, honour, and other direct or indirect means of power. Many of the ancient as well as modern instances of self-murder are to be attributed as much to the effects of reverses and mortified pride upon the mind, as to the higher motives to which this act has been referred. The suicides of Brutus, Antony and Cleopatra, and of Petronius and Sardanapalus, may be viewed in this light. Instances of self-destruction from mortified pride, consequent upon the failure of attempts at becoming conspicuous at public meetings, in the senate, or at the bar, or even upon the boards of a theatre, are not rare in modern times. The passion for notoriety too frequently entertained by silly or weak persons, when suddenly or rudely humbled, is often followed by a state of extreme mental collapse or depression, which sometimes terminates itself in suicide. The shock produced by the failure of long or warmly cherished hopes, of whatever kind, either suddenly overwhelms all efforts of reason and judgment, — the suggestions and impulses of passion and feeling being followed without control, — and thus induces at once a state of moral insanity as harbingers of the

suicidal act, or more slowly and surely developes some one or other of the forms of mental disease above described. In either case, the entertaining of the idea of self-destruction is an indication of insanity, inasmuch as it is connected with, or dependent upon, an overthrow of reason and judgment in the one, and a manifest disorder of mind in the other. But, in many instances, the act is perpetrated after the first shock of a reverse or disappointment has subsided — after reason has resumed her sway, and has been more or less exerted in calmly combating the feelings and suggestions, which such reverse may have called into activity. In these cases, the suicidal act is the result of a weighing of the present and consequent misery — of the wretchedness attending upon existing and prospective emotions, against the contingencies following the commission of this crime; and whatever of insanity may be present, consists only of the excessive emotions which reverses occasion, relatively to the strength of moral and religious principles by which they are, or should be, controlled. Hence it follows, that a number of suicides are committed after disappointments, losses, &c., in a state of mind not absolutely amounting to insanity — during an impatience under misforture, unrestrained by these principles, owing either to their weakness or absence. Various kinds and grades of disappointment or misfortune will lead to the commission of this crime, according to the susceptibility of the mind, the early education, the previous trials and tutoring of the understanding, the preceding career of success or amount of distinction, and various accessory circumstances connected with existing states of society and manners. The most common, however, are losses of fortune or of reputation, losses from gambling or from transactions of this description, moral and worldly humiliations, disappointed affection, and the losses of friends, — several of these being combined in their operations upon the mind.

578. *g.* One cause of suicide, of no infrequent occurrence in the present state of society, has been insufficiently considered by medical as well as psychological writers: this is, the *satiety* and *ennui* consequent upon excessive sensual gratifications, felt by minds imperfectly, or viciously educated, and unaccustomed to those pains, privations, and contrarieties of life, that impart happiness to the enjoyments by which they generally are sooner or later followed. Continued and excessive gratifications destroy the susceptibility and excitability of the nervous system, and exhaust its manifestations. The languor consequent upon enjoyment is not allowed to subside, or to be succeeded by renewed vigour, before the indulgence is repeated; and as languor and exhaustion increase with the repetition of the gratification which occasioned them, so the desire of escaping from these unpleasant sensations becomes also increased, and the want of varied and augmented excitement is experienced. Thus gratification begets desire, and desire calls for gratification, until all its sources are exhausted, all its varieties and grades are enjoyed; and the sated mind, no longer finding objects capable of exciting it, or of enabling it to emerge from the languor or depression consequent upon inordinate enjoyment, and deriving pleasure no more from the numerous sources which afford it to better regulated minds, feels most bitterly that "all is vanity and vexation of spirit." In the career of gratification, moral and religious principles are gradually at first departed from, and ultimately altogether despised; and once the mind is no longer able to receive enjoyment from the usual means, and has exhausted all the sources of it, within its reach, it has also approached the lowest grade of moral degradation, which either takes refuge in suicide, or is ready to have recourse to it, in moments of deep depression, or on occasions of severe contrariety or disappointment. The restraining influences of principle, and of regard to reputation, have ceased to influence the conduct; and, as soon as the continued and varied indulgence has exhausted vital and mental power, and dried up every spring of enjoyment, circumstances which depress, or vex the mind, will often give occasion to suicide, or suggest it; or the mind, no longer being capable of gratification, entertains at first the idea of suicide, and ultimately has recourse to it, in order to escape from the misery of the extreme languor which it is incapable of dissipating.—Whilst most of the causes of suicide, and especially those already noticed, are of an *active* kind, this may be viewed as altogether *passive*. Whilst the *former* act by violently exciting and disturbing the mind, the *latter* results from a defect of such excitements as will rouse it, and afford those gratifications, without which it either cannot exist, or prefers not to exist at all.

579. It has been said, that a Society for the mutual Encouragement of Suicide exists in Paris, the members of which undertake to terminate their own existences when life becomes insupportable; and the circumstance is almost verified by the character of the prevailing literature, and of the drama, in that capital. Numerous are the instances, not only throughout France, but also in this country, of persons who, having run an unbroken and rapid career of sensual gratification, and either exhausted its sources or their own means of enjoyment, have therefore put a period to their existence without any further reason, and without any previous proofs of their insanity beyond the inordinate indulgence of their desires and passions, and the predominant sway these had obtained over all their sentiments and actions.

580. *h.* Closely allied to the preceding is the occurrence of a *morbid* or *irresistible impulse to commit suicide*, without obvious mental disorder, or any moral cause sufficient to account for the act. Suicides of this kind occur most frequently in persons belonging to families hereditarily prone to insanity or suicide; and hence, in some instances, may be viewed as the first manifestation of the mental disorder. But they likewise are committed by persons who are not thus predisposed, and under circumstances which require a brief examination. — 1st. From a species of *mental sympathy or infection*, caused by perusing the details of cases of suicide furnished so circumstantially, and injuriously as respects the minds of the community, by the weekly and daily press. Instances are often occurring, of not one only, but of several suicides being committed during the first few days following the publication of some notorious case of self-murder — notorious as respects either the rank of the individual, or the mode of perpetrating it, or other circumstances connected with it. Such instances have been long remarked, and are of

increasing frequency owing to the existing state of society, of which some notice has already been taken (§ 272. 320.), and to which a brief reference will hereafter be made.—2dly. Suicide is, in rare instances, perpetrated from a species of *fascination*. The very knowledge of having in hand the means, or by a single step the power, of self-destruction, may give occasion to the impulse of committing it, which may even be instantly carried into effect by the weak, susceptible, or the morbidly disposed mind. I have had, on several occasions, to prescribe for highly nervous persons — those labouring under a morbid sensibility of the nervous system, and anxious susceptible states of the moral feelings — who could not handle a razor or sharp knife without being distressed by the desire or the idea of attempting suicide. Such persons, also, are unable to look down from great eminences, or over a precipice, without experiencing a desire of throwing themselves headlong. Byron has noticed this feeling, and ascribed it to

> “ The lurking bias, be it truth or error,
> To the *unknown;* a secret prepossession,
> To plunge with all our fears — but where? you know not,
> And that 's the reason why you do — or do not.

The bias to the unknown, here noticed by the poet, has little or no influence in originating this singular feeling, which is sometimes experienced by persons, both physically and morally sane, as well as by the weak in mind and body. This desire or impulse to precipitate one's self, when looking downwards from a very high precipice, obviously arises from no process of reasoning. Probably the suggestion of contrast may be concerned in producing it; and something may be owing to the unusual impression made upon the mind through the sense of sight — to the nature of the sensation itself. That this sensation is even pleasurable, — that it is attended by a sort of fascination,— is admitted by those who have experienced it; and, with many persons, the desire is so strong as to require the active exertion of reason to overcome it. That it causes a physical as well as a moral effect, — that it affects the circulation in, as well as the manifestations of, the brain,— is shown by the vertigo which accompanies it, and which often occurs without the desire of self-precipitation or destruction. Indeed, I doubt much, whether or not the feeling produced in the mind by this impression on the sense of sight is *primarily* attended by such a desire. It would seem, that the sensation is pleasurable, and that it excites a desire to throw one's self headlong in the gratification of it. But reason immediately dictates, that this act would be attended by self-destruction; and from this the sane mind recoils with a shudder — recoils from the consequences of enjoying the feeling which the nature of the sensation had thus suggested. This subject, although noticed by Falret, Andral, and others, has not been hitherto investigated with reference to suicide. But it is not improbable, that persons who have entertained the idea of self-murder, and yet have not been able to summon resolution to commit it, knowing the influence of the sensation of looking down from a precipice upon the mind, have had recourse to it, in order to aid their weak resolves. Others, probably, in states of high susceptibility and extreme weakness of the nervous power, have followed the impulse or fascination thus produced, before reason had time, or recovered power, to counteract it.

581. *i.* Suicide may, under certain circumstances, become almost *epidemic*. Indeed, an epidemic prevalence of the act has been noticed, without any other causes, besides those just stated, to account for it. Sydenham has mentioned such an occurrence, and others have taken place in more recent times. During the atrocities of the French revolution, — atrocities the most humiliating in the history of the human mind, — the “ damned spot” in the annals of France, which neither her science can obliterate, nor her military glory can conceal, — suicides were most prevalent, owing to a variety of causes, and often to a combination of circumstances and feelings, — the loss of honour, fortune, and friends; the impulses of passions, and of remorse, despair, &c. The frequency of suicide at certain periods, and in particular places, is caused chiefly by political changes and by commercial crises, affecting the position of numerous individuals in society, mortifying their pride, and changing their prospects. Something, also, may be imputed, on certain occasions, to *mental sympathy* or *imitation*, and somewhat even to a passion for *notoriety;* but impatience under misfortunes and disappointments is the most common cause. M. Andral states, as proving the influence of imitation in causing suicide, that one of the inmates of the “ *Invalids*” was found hanged in a particular corridor. Two days afterwards, a second was found in the same place; then a third, and even a fourth. This corridor was shut; after which no more hanged themselves. He further remarks, that, not long ago, it was the fashion for people to throw themselves from the top of the column in the Place Vendôme. This was, however, only a fashionable mode of committing an act which is always common in Paris, and which was not the more frequent because this mode was preferred to the other means more usually adopted. It has often been noticed, in most civilised as well as uncivilised countries, and particularly in communities closely associated by feelings and interests, as in regiments, &c., that a single instance of self-murder is soon followed by many.

582. *k.* Self-murder has been often perpetrated in order to *escape exposure* and *punishment* consequent upon detected crimes. Indeed, this is one of the most common moral causes of suicide in this and other civilised countries, and instances of it are of daily occurrence. Many of the actors, and prime movers, in the unprecedented atrocities of the French revolution, committed or attempted suicide, when they came in their turn to experience a direful retribution. Criminals of all grades, from the petty depredator to the state delinquent, have sought refuge in self-murder, from the accusations of conscience, the shame of exposure, and the extreme wretchedness attending conviction and the last penalties of the laws. — Detection of, as well as remorse caused by, *conjugal infidelity*, has been followed by suicide. In the one case, this act is resorted to in order to avoid the exposure and shame consequent upon detection, although remorse influences the mind in part to form the resolution; in the other, self-reproach is often the sole cause.

583. The desire of escaping from *moral* or *physical pain*, or from *anticipated* or *impending want*, is not infrequently productive of self-de-

struction. Under this head may be comprised *seduction*, and *despair*, however produced. How numerous are instances of suicide caused by the despair consequent upon seduction, the desertion of the seducer, and all the contingent miseries, heightened by the fears and anticipations of the seduced, by the desertion of friends, and the scorn of society. *Physical pain* is much less frequently a cause of suicide, than moral suffering. Many, however, of the ancient Stoics put an end to pain by terminating their lives, — thereby following the example of ZENO, the founder of their sect; and several Romans have been mentioned by PLINY and others, as having adopted this course. Dr. HASLAM states, that a gentleman destroyed himself to escape from the tortures of gout. I have been told by several persons that, whilst suffering the pangs of neuralgia, it required the utmost efforts of their moral principles to restrain them from perpetrating self-murder. Numerous instances are on record, of persons who, having believed themselves suffering incurable maladies, have had recourse to suicide, as a more pleasant mode of dying; this crime being committed by them under the impression that a natural death is more painful than that inflicted by themselves. It has, however, been long known, and shown by HUFELAND and W. PHILIP, that death from disease, even when the mental faculties are retained to nearly the last, is attended by a gradual abolition of the general sensibility that is by no means painful or distressing; the patient ceasing to exist as happily and calmly as when falling asleep, unless under peculiar circumstances.

584. *l.* Suicide is often committed in *states of irritation and chagrin*, particularly by persons of a morose, splenetic, or irritable temper. It is sometimes suggested to such persons by a desire to excite regrets or self-reproach in the minds of those who have offended them, — by a feeling of *revenge*. Most of the suicides committed by *children* are caused by a desire of this kind; particularly when they follow punishment of any description. Self-murder arising from *jealousy*, also, depends chiefly upon the promptings of this feeling, in connection with anger; and is most apt to occur in *hysterical*, *nervous*, or *weak-minded females*. Some years ago, I was present at an evening party, where a young lady, engaged to a gentleman present, was seized with hysterical convulsions, in consequence of his attention to another. Upon recovering from them, she suddenly left the house, without the direction she took being observed. The following day she was taken out of the Canal near the Regent's Park, in her ball-dress, — she having gone upwards of a mile in order to carry her design into execution. A lady, on a similar occasion, took a large quantity of laudanum. The usual means of restoration producing no effect, I was sent for: she was ultimately recovered by the affusion of cold water on the head.

585. *Domestic contrarieties* and *misery* — the frequent recurrence of petty vexations — the tyranny of intimate connections, and the positive ill-usage of others — suits in courts miscalled those of *equity*, on the *lucus a non lucendo* principle — may, from their continuance, severity, and repetition, especially under aggravating circumstances, and in states of high susceptibility in the unhappy sufferer, drive even the strong-minded and the well-principled into a state of temporary despair or desperation — may fire the brain to madness, during which self-destruction may be attempted. A most talented and accomplished young lady, suffering from a combination of the above circumstances, took, upon retiring to rest, and with a suicidal intention, a very large quantity of laudanum, — more than is usually productive of a fatal effect. She wakened late the following day, with a most distracting headach and general disorder, recollected the act of the previous night, regretted the attempt, and sent for medical aid — determined, however, to conceal the cause. Her health, from this and the other circumstances alluded to, continued greatly impaired for many years, and several physicians were consulted. She came under my care, and at last mentioned the suicidal attempt, which was never further divulged. She now continues, in good health, to ornament the society in which she moves. M. FALRET mentions, among other causes of chagrin producing suicide, that of having been calumniated; and he states, that a considerable number of persons commit this act chiefly with a desire of vindicating their reputation, — no other means of vindication being in their power.

586. The *state of desperation*, into which a person influenced by the *passion of love* may be thrown by disappointment, is actually that of insanity — at least, of moral insanity. A gentleman endeavoured to obtain the favourable notice of a lady, of whom he had become enamoured, but had not succeeded. He committed suicide by opening a vein in his arm, and, whilst the blood was flowing, he wrote a note with it, acquainting her with his act. She was soon after attacked by nervous fever, which was followed by insanity, during which she fancied that she heard a voice commanding her to commit suicide. Other instances of a similar kind may be adduced.

587. Some persons, during *intoxication*, have a remarkable disposition to commit self-murder. This disposition may be the consequence of either habitual or occasional intoxication; and it is sometimes connected with *delirium tremens*, or, rather, depending upon the illusions attending that disease. Some persons, who have received, at a former period of their lives, severe injuries of the head, experience this disposition, when even but slightly affected, in other respects, by intoxicating liquors — especially if they suffer any contrariety or opposition at this time. Cases of this kind have been noticed by M. FALRET, and others, and by the author.

584. *m.* Instances of *mutual or associated suicide* are not rare, particularly in recent times. The self-homicides of LUCIUS VETUS, SEXTIA, and POLLUTIA, during the reign of NERO, and of SARDANAPALUS, may be noticed amongst the many instances recorded in ancient history. During the French revolution, and the wars consequent upon it, associated suicides were frequent. Nine conscripts who had concealed themselves, having been discovered, determined to destroy themselves rather than serve: they drowned themselves together. The most common causes of this mutual crime are, opposition on the parts of parents to the fulfilment of marriage engagements entered into by young persons, want or disappointments in the married state, and family dishonour. The bodies of two young persons were found in

the Seine, with a piece of paper attached to them, testifying to their ardent affection, and that they perished together that they might be eternally united. Occurrences of this kind are, however, not unfrequent in this and other civilised countries; and instances are not rare of lovers committing mutual suicide, even where there was no opposition to the consummation of their wishes. In this latter case, some cause of chagrin or disappointment has occurred, and maddened the mind already disordered by one dominant passion, — the suicidal intention entertained by either being adopted by the other. From the accounts of several cases of mutual suicide attempted in recent times, there is every reason to suppose that the attempt was merely *simulated* by one of the persons who had agreed to commit this crime; and that it had been contrived entirely with the intention of getting rid of an object no longer one of endearment. This is more likely to be the case, when a young woman has become pregnant by one of those drunken debased workmen who prey upon females in large or manufacturing towns. This and similar instances have appeared in the public prints. A man out of work, and his paramour, having agreed to commit mutual suicide, procured some laudanum (about four ounces), and divided it into two equal quantities. The man proposed that they should turn back to back whilst taking it, in order that they might not falter in the act. The female died soon after; but the man did not appear to be affected. From the evidence at the inquest, it did not appear that he had actually entertained an intention to destroy himself, or had taken any of the laudanum. Analogous cases have occurred, where drowning has been the mode of carrying the suicidal act into effect; one of the parties having escaped.

589. Want and other causes of distress, and even more petty grievances, may, in states of mind but little influenced by moral and religious principles, induce husband and wife to commit mutual suicide. In the present state of society, especially in Paris, where the passions are roused and excessively gratified before reason and judgment are informed — where sensibility is exhausted at an early age, by the excitement of sensations, in great variety, in rapid succession, and increasing intensity — where the thirst for pleasure is promoted by a loose and stimulating literature — and where the end of enjoyment is generally shown, in the pages of the novelist and in the scenes of the dramatist, to be murder and suicide, — instances of associated self-destruction, even among persons in no way dependent upon each other, have not been rare. Young men, who have exhausted either the means or the power of enjoyment, or both, in the career of vicious indulgence, and unrestrained by principle and by fear, have followed the example held out to them by the popular writers of the day, and "shuffled off this mortal coil" in the most dramatic forms they could devise. Two young men entered a *restaurant*; ordered an expensive dinner, with costly wines, without the intention or the means of paying for it; and soon afterwards committed suicide together. On a table in their room were found written papers, expressing aspirations after greatness without either labour or care, and contempt for those who could live by their own exertions, with sundry quotations from Victor Hugo and other exciting writers of the day. The whole was terminated by a request that their names and the manner of their deaths might be sent to the newspapers! Sensation is the object and end of living, with many, in the present day; and when it can no longer be excited, — at least, to the pitch, or in the tone, capable of yielding enjoyment, — life is relinquished in such a way as is most likely to excite the sensations of others.

590. *n.* *Murder* is often committed first, and *suicide* afterwards, prompted by the same or different motives. — *Jealousy* is one of the most frequent causes of this combination of crimes, which, however, may be prompted by a variety of circumstances, — indeed, by all which occasion suicide or insanity. The following instances are fully detailed by Mr. Winslow: — M. De Pontalba, whose son was a most distinguished officer, and married to a most extravagant woman, saw with distress the ruin she was bringing upon him. In order to save the son, the father shot the daughter-in-law, and afterwards himself. — A gentleman of London was married in the country to the object of his affections. He had drawn the charge from his pistols the previous night, but his servant had loaded them again the following morning without acquainting him. After the ceremony he took up one of the pistols, which he knew he had unloaded the night before, and playfully rallied the lady on her cruelty, saying, "You shall die, you tyrant! you shall die with all those instruments of death about you — with that enchanting smile, those killing ringlets of your hair?" — "Fire!" said she, laughing. He pulled the trigger, and she was shot dead. He called up the servant, and, upon his entering, locked the door, and inquired if he had loaded the pistols? "Yes," was answered; on which his master shot him with the undischarged pistol. He wrote * to his wife's father, explaining the calamity, and then threw himself upon his sword.

591. Instances are not rare, of a parent or parents, influenced either by want, or by homocidal monomonia, killing their children, and then committing suicide. Although extreme wretchedness is sometimes the chief occasion of these occurrences, yet it is seldom the only occasion. More frequently some form of partial insanity is either the principal or concurring cause; some circumstance having occurred to excite the homocidal propensity. Dr. Gall mentions the case of a soldier, of whose wife an officer had become enamoured without succeeding in his wishes. The soldier appeared dejected and morose, but the following day appeared quite tranquil. A few days afterwards, he and his wife attended the confessional and took

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* The letter will show the state of mind produced by causing the death of a much-loved object, particularly as leading to suicide. This gentleman had written immediately upon the performance of the ceremony, and had concluded the note as follows: — "The bride gives her duty, and is as handsome as an angel. I am the happiest man breathing." This soon afterwards was written: — "Two hours ago, I told you truly that I was the happiest man alive. Your daughter lies dead at my feet, killed by my own hand, through a mistake of my man's charging my pistols unknown to me! I have murdered him for it. Such is my wedding-day. I will follow my wife to her grave: but before I throw myself upon my sword, I command my distraction, so far as to explain my story to you. I fear that my heart will not keep together till I have stabbed it. Poor good old man, remember that he who killed your daughter, died for it! In death, I give you thanks, and pray for you, though I dare not pray for myself. If it be possible, do not curse me. Farewell for ever!

the sacrament; they dined in good spirits, and went out to walk; he expressed his strong affection for her, and inquired if she had made a full confession to the priest. He then plunged a poniard in her breast. He repaired to his house, and seizing his children, killed them with a hatchet. He afterwards went to the main-guard, and deliberately detailed the whole particulars, concluding with the words — "Let the officer now make love to my wife, if he pleases!" He then stabbed himself to the heart.

592. *o.* Suicide is often *simulated*, with a view of obtaining a desired end; — the lover threatens or seems to attempt it, to induce a return of his affection; the spoilt child, to obtain a compliance with his wishes; and the indulged wife, submission to her caprices. In such cases, either a small portion of laudanum is usually procured, and this is diluted with some fluid, to increase the apparent quantity; or a large quantity is taken, when seen by some person, or when instant aid may be obtained. Females have resorted to this plan, to try the affection, or to compel the fulfilment of the engagements, of their lovers; but, in cases of this kind, little more is necessary to be known, than that such acts are sometimes resorted to; and that a poisonous dose may be actually taken, in order to appear the more in earnest, knowing that assistance is near, and that it will be successfully employed. Drowning even may be feigned in similar circumstances. I have, however, seen two cases, in which fatal results very nearly followed this experiment upon the endurance of affection.

593. *B. Predisponent circumstances.* — Besides the above *exciting* occasions of suicide, others, which powerfully *predispose* the mind to their influence, and to which attention has been imperfectly directed, require to be briefly noticed, — namely, *hereditary predisposition; systems of philosophy and of morals; states of education, of manners, and of society; distracting subjects and studies; irritation caused by difficult and perplexing circumstances; injuries of the head, and physical disease; the influence of climate, of seasons, weather, and states of the air on the nervous system, and of age, sex, and temperament*, &c.

594. *a.* The influence of *hereditary predisposition* in occasioning suicide, is well established. In a very large proportion of instances, either self-murder has been perpetrated by one of the older members of the family, or some form or other of insanity has appeared in one or more of them. Very frequently, one or both parents of the suicide have been noted for eccentricity, or the waywardness, instability, or violence of their dispositions and tempers. Instances have occurred, of the children of a parent who has committed self-destruction, perpetrating the same act when they have grown up, or at later periods of their existence. Even more than one — several — of the offspring have experienced this fatal disposition upon arriving at nearly the same epoch of life as that at which it was committed by their parent. Dr. Gall has observed the suicidal predisposition in several successive generations. I have known it in three generations. M. Falret considers suicide to be more intimately dependent upon hereditary predisposition, than any other form of insanity; but this is chiefly the case in respect of suicide connected with melancholia and other forms of partial insanity.

595. *b.* The influence of *systems of philosophy and of morals*, in increasing the frequency of suicide, is undoubted. The doctrines of Zeno and Epicurus encouraged it among the ancients. Since the revival of learning, Montaigne was one of the earliest and ablest of those who favoured the perpetration of this act, but all his arguments are derived from the ancient Stoics. The early writings of Dr. Donne seemed to favour suicide; but they actually go no further than to show, that contempt for, or even the sacrifice of, life is praiseworthy in the discharge of our duties, and in the execution of beneficent and noble undertakings. The reasonings of Hume, and the indirect support which the doctrine they favour received from the writings of Montesquieu, of Rousseau, of Göthe, De Staël, and others, probably contributed less, than is supposed, to the increase of this crime. It is, however, not to be disputed, that the loose principles disseminated, and the violent feelings displayed and exerted, by the warm and passionate writings of Rousseau and Göthe, promoted this end much more than the metaphysical and moral arguments urged in favour of it. Madame De Staël has stated that the *Sorrows of Werter* caused more suicides, at one time, in Germany, than all other circumstances combined. Whatever of mischief has arisen in this direction from modern writings, has been indirect — has proceeded chiefly from the injurious influence exerted upon the mind by an exciting, profligate, and debauching literature, for which the state of society and manners has procured a very extensive circulation; and not so much from the arguments adduced by a few metaphysical writers of more confined, although more lasting, reputations. The poison instilled, continually and in wide profusion, into the minds of all classes of the community, through the media of the numerous works of passion and imagination with which the presses of the civilised world at present labour; the taste for their perusal, which numerous circumstances of the times conspire to diffuse; and the moral contamination which they spread, or render still more deep and malignant, most sensibly dispose the mind to suicidal impulses, when subjected to the exciting causes already noticed. That the doctrine of *Materialism*, however, and the general scepticism to which it leads, disposes the mind to suicide, inasmuch as it weakens the belief of a future state of rewards and punishments, cannot be disputed. The *infidelity* so widely diffused towards the close of the last century, by means of the sceptical writings of that, and of a somewhat earlier, period, doubtless, contributed to the frequency of suicide, especially in France, during that eventful epoch; and there is every reason to believe that its influence is still exerted, although to a somewhat less extent than then.

596. *c. Education and states of manners and of society* may be such as to favour, or to counteract, a tendency to self-murder. If *education* be conducted without regard to religious and moral principles — if the knowledge of words, of things, of facts, and of phenomena, be made to supersede sound principles of conduct, and of belief — if the amount of knowledge communicated, rise above, or reach beyond, the sphere of utility and of enjoyment — if, in short, education be conducted in the manner in which I have already shown it (§ 271, 272.) to be generally conducted

in the present day, — it will tend much more to increase the number of our wants, to develope our desires and passions, to augment their intensity and violence, at the same time that it removes from them those salutary restraints which prevent them from becoming dangerous to others or destructive to ourselves. The influence of education thus loosely conducted, upon the *pseudo-liberal* principle of rendering it acceptable to all creeds, — to the Churchman, the Romanist, the Presbyter, the Baptist, the Socinian, and all other persuasions — "to Christian, Turk, and Jew" — proves injurious, not only in the way just stated, but also in giving rise to forced, unnatural, over-reaching, ambitious, and unprincipled states of society; and these states, in proportion as they are developed, are the parents of crime, insanity, and suicide. Throughout the community, and particularly in the middle classes, there is a constant effort to rise above the ranks which Providence has assigned; and to partake of the pleasures and luxuries which are far beyond the means of some, and are conducive to libertinism and profligacy in many of those who enjoy them the most. The end of excessive indulgences, and of debauchery in every form, particularly when early pursued, is suicide or insanity, or the unequivocal combination of both, in many instances.

597. There can be no doubt of the pernicious principles recently inculcated, particularly amongst the lower orders of society, and to which the name of *Socialism* has been given, having already conduced, in several cases, to suicide. This doctrine, inasmuch as it unlooses the ties of society and of consanguinity, as it admits of no moral responsibility, and as it allows no expectations of future rewards and punishments, is opposed to all moral and religious obligations, — it favours vice and profligacy, overthrows all virtuous and salutary restraints upon the feelings, and, by allowing without control the indulgence of the desires and passions, favours what has just been shown to be the ultimate consequences of this course. In this state of society, the endearments of friends, of connections, and even of relations, cease to exist. The ties which bind society together in harmony, are broken asunder; and as soon as the race of selfish indulgence is run, — as the power of enjoyment is exhausted,—the mind, having no affections, no friendships, no self-consoling and truly gratifying recollections to repose upon, at once sinks into a state of abject wretchedness, which it seeks to terminate by self-murder.

598. In illustration of what I have stated, I may adduce what has been advanced by a French writer, in accounting for the frequency of suicide. This writer remarks, that the high civilisation and refinement, the luxury, the clash of interests, the repeated political changes, combine to keep the moral feelings of the Parisians in a state of tension. Life does not roll on in a peaceful and steady current, but rushes onwards with the force and precipitation of a torrent. In the terrible struggle, it often happens that the small minority, which has been elevated high above the multitude for a time, falls down as suddenly as it has risen. The drama of life is full of miscalculations, disappointments, disgust, and despair: hence the numerous suicides. But there are other causes in operation,—and not the least, the remarkable character which romances, plays, and spectacles have assumed. The public taste has undergone a complete revolution in this respect. Nothing is more patronised now at the theatre, than the display of crime unpunished, human misery unconsoled; and a low literature, impregnated by a spurious philosophy, declaiming against society, against domestic life, against virtue itself; applauding the vengeance of the assassin; and recognising genius only as it is seen in company with spleen, poison, and pistols. This writer concludes with appealing to those who read the novels of the present day, and who visit the theatres, whether he has exaggerated his statement; and I may appeal to all in this country, who are acquainted, not only with the state of our popular literature, and of the stage, but also with the character of the daily, weekly, and even monthly publications, which are hourly devoured by all classes — with their natures and contents, — whether this writer has not underestimated the influence of these causes.

599. *d. Harassing subjects and abstract studies*, especially when undertaken by minds which have undergone an imperfect preliminary course of information and discipline, sometimes occasion so much distraction as to give rise to suicide or some form of insanity. Several instances of suicide have occurred from the pursuit of subjects too abstract either in themselves, or in relation to the power of the individual's mind. In such cases, an extreme state of irritability of temper is often evinced before the suicidal act is attempted. Indeed, the irritation produced by any difficult and perplexing circumstance, as well as by great losses and disappointments, is very apt to terminate itself in self-murder, when experienced by the weak, the indulged, the fortunate, or the undecided and wavering mind. In the present general scramble for wealth, often merely for existence, and as often only to obtain the means of retaining a position falsely usurped, or too sanguinely entered upon, the irritation and distraction which often necessarily result, not infrequently lead on to suicide. The rich man gambles in the funds, foreign or domestic, or in joint-stock shares, or in the prices of foreign and domestic produce, in order to double by a single speculation, what he had slowly acquired by prudence or application. The poor man places his last or only stake, and his own and his family's happiness, upon a contingency not more secure than the hazard of a die. In either case, adverse fortune brings distraction, which reason is not always able to calm. A gentleman, who had acquired a large fortune by a long life of prudent application to business, ventured the greatest part of it in the foreign funds: he might, at one time, have sold with great advantage: but they fell rapidly; and, under the contemplated loss of 70,000*l.*, he terminated his existence. Another, similarly circumstanced, went repeatedly with the intention of selling at a time when he might have gained many thousands. His want of decision prevented him on each occasion from carrying his design into execution: the period of extricating himself had passed; and, in a state of irritation at his loss, and at his wavering state of mind, he committed suicide. But such occurrences almost daily take place; for trading and commercial transactions very generally possess, in the present day, very much of the same gambling character. Even the small capitalist is desirous of investing, or of speculating with, the

savings of years, in some one or other of the numerous schemes, promising large returns, concocted by those who are well aware of the existing passion for gain, and who know well how to turn it to their own advantage, but to the loss, misery, and destruction of their dupes, many of whom, in a state of distraction occasioned by their ruin, commit suicide.

600. *e. Injuries of the head, and physical disease,* sometimes either predispose, or directly give occasion, to suicide.—*Injuries* received at a remote period may give rise to it, without having previously excited any marked state of disease, or even mental disorder; and yet, upon examination after death, lesions of structure have been, in some instances, detected, either in the brain or its membranes, or even in both. More frequently, however, physical disease, often slight, but still manifest, shows itself; or some degree of mental disorder, or some illusion, is evinced, of which the suicidal impulse is only a symptom or a concomitant. In most cases, the injury which originated the mischief, has been so slight as to be considered unimportant by both the patient and his friends.

601. *Visceral disease* has a similar influence in causing suicide, as I have shown it above (§ 309. *et seq.*) to exert in producing insanity. When the abdominal viscera, particularly the digestive organs, are chiefly in fault, hypochondriasis and melancholia are first developed; the disorder of these organs acting upon, or disordering the circulation in, the brain. When the intention or the impulse to commit self-murder originates in primary disease of the brain itself, some form of monomania, or of mania, generally either precedes, or attends it. In most cases of suicide arising from visceral disease, either organic nervous energy has been remarkably depressed by exhausting causes, as by masturbation, drunkenness, and libertinism; or this disease has been only an accidental or concurring cause,—one or more of the circumstances or occasions already noticed having been more or less concerned in producing the suicidal determination.

602. *f. Seasons, weather, and climate* have been generally supposed to exert some influence in disposing to suicide. M. VILLENEUVE considers that a warm, cloudy, and humid state of the air increased the number of suicides in Paris, Marseilles, and Rouen; and that stormy weather seemed to exert a similar influence. The effect of warm and humid states of the air upon the nervous system is often very manifest, in depressing its energies, in weakening the mental powers, and in lowering the spirits. The greatest number of suicides has been said to occur when the thermometer ranges above 75°. Dr. BURROWS observes, that, on examining the tables kept at Westminster from 1812 to 1821 inclusive, and at Hamburgh from 1816 to 1822 inclusive, the number of suicides in both cities was greatest in July, and least in October. A similar result has been remarked in respect of Rouen and Copenhagen. From 1817 to 1826, the number of suicides committed in Paris amounted to 3205; of which 997 were perpetrated in spring, 933 in summer, 627 in autumn, and 648 in winter; the following being the numbers with reference to the months:—January, 213; February, 218; March, 275; April, 374; May, 328; June, 336; July, 301; August, 296; September, 248; October, 198; November, 131; December, 217.—November has been said to occasion greater despondency and despair, and more suicides, than any other month; yet this month, both in London and in Paris, presents the smallest number of self-murders, with the exception of October. Notwithstanding the influence of warmth and humidity of atmosphere, in increasing the number of suicides, this act is much more common in the colder than in the warmer countries of Europe;—France, Germany, England, and Denmark, being the kingdoms in which it is most frequently committed. In the summer of 1806, 60 cases took place in Rouen, and nearly 300 in Copenhagen; the weather being warm and moist. In Berlin, 500 instances occurred in six years and a half; whilst at Naples there was, in 1826, only 7, in a population of 349,000; and in all Spain, in the same year, there were only 16 cases. Dr. KAMPTZ, of Berlin, has assigned the proportion which suicides bore to the population, in several places in Europe, for the year 1817. I abstract only a few cities:—

Berlin	57	suicides,	166,584	popul.,	or 0,34 in 1000.
Breslau	58	—	63,020	—	or 0,92 in 1000.
Magdeburgh	50	—	27,869	—	or 1,79 in 1000.
Copenhagen	51	—	84,000	—	or 0,60 in 1000.
Paris	300	—	700,000	—	or 0,42 in 1000.
London	200	—	100,000,000	—	or 0,20 in 1000.

No just inference, however, can be drawn from returns of the suicides committed during one year only, in different climates or countries; as several circumstances, either uncommon or fortuitous, may have occurred, in one or more of these climates, at that period, to increase or diminish the usual numbers,—as great prosperity or adversity, plenty or scarcity, political commotions or revolutions, &c.— Nor is it to *climate* or *season* that much influence is to be imputed in occasioning suicide; but chiefly to the various circumstances already noticed, in connection with religion, commercial speculation, and states of society. It is sufficiently established, however, that, throughout the most of Europe, and in the United States of America, suicides have become much more frequent than at the above, or at almost any preceding, period, unless during the French revolution. The number has increased in Paris from 300 in 1817, to 511 in 1826; and in Copenhagen, from 209 during 1790, and the four successive years, to 319 during the first five of the nineteenth century.

603. The admitted increase of suicides, more especially in this country, is not to be altogether referred to the more general influence of the several occasions already mentioned; but in a great measure, also, to the increased numbers and circulation of those prints, which abound with the disgusting details of profligacy, crime, and suicide. Dr. BURROWS justly remarks, "that the public taste has become more and more vitiated and debased by this species of gratification; and nothing is found so attractive as tales of horror and of wonder; every inquest that is held upon a person who has destroyed himself, being read with great avidity." The ludicrous police reports of criminal acts furnished by the daily panderers to our more debased desires, scenic representations of successful vice and crime, and the constant circulation of suicidal acts in all the periodical prints, serve most essentially to familiarise the minds of the lower classes especially, with these acts, and to diminish

the detestation with which they are generally viewed at first, until the moral sensibility becomes altogether blunted by their perusal. The repeated presentations of these crimes to the minds of the ignorant and vicious,— often not only divested of their attendant horrors, but even clothed in attractive garbs, — readily suggest a recourse to them, in circumstances which cause distress, irritation, or distraction. Literature — if, indeed, the trash vomited hourly from the steam press should be dignified with the name — has become the most debased of modern ways of traffic ; and its chief end, in the present day, is to encourage those feelings and desires, by means of which its diffusion and profitable returns may be augmented. In order that this may be the more surely effected, and with the greatest amount of moral contamination to the community, and of pecuniary profit to the writers and proprietors, — that the criminal appetite may be pampered and increased — that each successive meal of criminal indulgence may be followed by a greater relish, and a more craving desire for its repetition, — foreign countries are ransacked to furnish what our own cannot supply in sufficient frequency and piquancy.

604. *g. Age and Sex.*—The frequency of suicide varies at different *ages*. During the early epochs of existence, the sanguine expectations, which are generally indulged, and which soon take the place of temporary despondency and distraction occasioned by disappointments and losses, tend to diminish the number of suicides. In the middle and more advanced periods of life, sensibility becomes exhausted or blunted, whilst cares and anxieties increase in number and intensity ; and the attachment to life is much impaired. The desire of life afterwards increases, and frequently in proportion as old age advances. M. Falret has shown, that it is from 35 to 45 that the greatest number of suicides occur. Of 6782 cases, 678 were under 20 years of age ; and of this number, 487 were between 15 and 20, and 181 below the age of 15. A child of nine years old * wished to destroy itself ; but this is the only case of so early an age. After 45, suicide becomes more and more rare ; and above 70, there are scarcely any instances of it. The father, however, of the celebrated Barthez killed himself at the age of 90 ; and his son, when he was old, wished to follow his example.

605. Both *sexes* display the suicidal tendency, but the male sex most frequently. M. Esquirol considers the proportion of males to females to be 3 to 1 ; but there are differences according to countries, arising from the greater or less influence of many of the circumstances shown to favour this act. Thus, in France, there are more suicides among women than in Germany. It has been observed, both in England and on the Continent, that nearly two thirds of suicides were unmarried. This state, therefore, is much more favourable to self-destruction than the married condition.

606. *h.* Suicides are most frequent among persons of the *melancholic temperament* and *bilious constitution*, with a pale or sallow, or yellowish complexion, and hard or sharp features. Such persons are more liable than others to disorders of the biliary and digestive organs. But this crime is not infrequently committed by the nervous and irritable, and even by the sanguine and plethoric. Females of this latter constitution occasionally attempt or perpetrate self-murder, just before or during the catamenia, or from some irregularity of this evacuation. M. Esquirol states, that the *scrofulous diathesis* is remarkable in a number of suicides.

607. *i.* Several *tables*, showing the frequency of the several *causes* of suicide, have been published ; but are obviously deficient in precision, as well as in the truth of the data upon which they are based. Moreover, this act is not generally prompted by a single circumstance, or cause, only ; but by the combination, concurrence, or succession of several. With great allowances, and reservation, the following may be adduced, in the absence of more accurate information, as to the comparative influence of the circumstances occasioning this crime. The suicides committed in London, between the years 1770 and 1830, have been stated (*London Med. and Surg. Journ.* vol. v. p. 51.) to be 4337 men, and 2853 women ; and the causes have been thus assigned : —

Causes.	*Men.*	*Women.*
Poverty	905	511
Domestic grief	728	524
Reverses of fortune	322	283
Drunkenness and misconduct	287	208
Gambling	155	141
Dishonour and calumny	125	95
Disappointed ambition	122	410
Grief from love	97	157
Envy and jealousy	94	53
Wounded self-love	53	53
Remorse	49	37
Fanaticism	16	1
Misanthropy	3	3
Cases unknown	1381	377

According to M. Falret, of 6782 suicides committed between 1797 and 1823, 254 were from disappointed love—157 being in women ; 92, from jealousy ; 125, from the chagrin caused by calumny ; 49, from a desire, without the power, of vindicating character ; 122, from disappointed ambition ; 322, from reverses of fortune ; 16, from wounded vanity ; 155, from gambling ; 287, from crime and remorse ; 728, from domestic distress ; 905, from poverty ; 16, from fanaticism. Upon comparing this table with the preceding, very great inaccuracy will be apparent, — proving the very little dependence to be placed upon numbers in medical details. Of 500 suicides, committed in Berlin, during six years and a half, Dr. Caspar states that 14 were caused by offended honour ; 61, by insanity ; 54, by drunkenness and dissipation ; 32, by dread of punishment ; 18, by debt and domestic trouble ; 12, by love ; 11, by matrimonial strife ; 3, by disgust of life ; 12, by disease and pain ; 1, by religious excitement ; and 282, by causes which were not specified.

608. *C.* The *modes selected of quitting life* may be briefly noticed. These, in many instances, have some reference to the occupation or profession of the suicide. Thus, military and naval men shoot themselves ; chemists and medical men poison themselves, chiefly with prussic acid ; barbers and hairdressers cut their throats ; shoemakers stab themselves, &c. — Fire-arms and sharp instruments, particularly pistols, razors, knives, and daggers, are most frequently employed by men. Drowning, hanging, poison, and precipitation

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* I am now attending, for a physical ailment, a boy of 12 years of age, who attempted suicide by hanging, from a feeling of revenge for being punished.

from windows or great heights, are the means of self-murder most commonly resorted to by women. In France, asphyxy, by the vapour of burning charcoal, is often selected by females, and even by males — particularly in cases of associated suicide. Hanging, drowning, and poison are, however, the means most frequently resorted to by both sexes. The choice thus made, does not always depend upon what may be supposed to cause the easiest or the most rapid death; but, probably, upon that mode which offers the greatest facility, or is the most readily carried into effect in moments of irritation, distraction, or depression. It is remarked, that a very large proportion of suicides by drowning, in London, are committed by persons residing in the vicinity of the river, and of the Regent's Canal.

609. Dr. Caspar states, that of the 525 cases of suicide already noticed, 234 were committed by hanging; 163, by shooting; 60, by drowning; 17, by cutting their throats; 20, by stabbing; 19, by throwing themselves from windows; 10, by poison; 2, by opening an artery. M. Esquirol gives the following details of 205 cases of suicide in *females:* — 49, by hanging and strangulation; 45, by precipitation from windows, &c.; 2, by firearms; 18, by sharp instruments; 7, by poison*; 5, by asphyxy; 48, by starvation; 31, by drowning.

610. ii. Arrangement of the Causes of Suicide. — *A. Circumstances predisposing to this act.*— Hereditary predisposition; the melancholic, bilious, and irritable temperaments; the middle period of life; the male sex; the unmarried state; indulgent and injudicious education, without reference to moral and religious principles; masturbation and sexual excesses; drunkenness; immoral amusements and exhibitions; the perusal of loose productions, and of criminal and suicidal details; idleness and indolence; habitual recourse to powerful mental excitement; infidelity, or a disbelief of a future state of rewards and punishments; states of the air, or of the season or weather, occasioning depression of the nervous energy.

611. *B. Circumstances exciting this act, or occasional exciting causes.* — *a. Direct occasional causes.* —The passions and feelings, — particularly love, conjugal affection, jealousy, ambition, humiliated pride, sentiments of dishonour, loss of female virtue, feelings of shame, violent anger, fear, terror, and remorse; gambling, either from want, or a desire of strong emotion and excitement, or covetousness; imitation, or mental infection; fascination on looking down from precipices; chagrin, desperation or distraction; reverses of fortune; disappointments, domestic unhappiness, and family dissensions; the several forms of moral and partial insanity, especially melancholia and religious insanity; the different states of general insanity, particularly mania and puerperal insanity; and the delirium consequent upon numerous physical maladies.

612. *b. Indirect occasional causes.* — Bodily diseases of various kinds; violent pain, and incurable maladies; the abuse of intoxicating liquors, of opium, of mercury; distaste of life connected with the change of life in females, and the loss of attractions from small-pox, &c.; ennui, or tædium vitæ, consequent upon an effeminate and indolent state of existence, or a state of mind in which the passions are without an object to excite interest, or are incapable of being roused to feel an interest; want and its attendant miseries; anticipated exposure or punishment; motives of revenge.

613. *c. General causes.* — Governments which furnish numerous examples of violent deaths, in the execution of their laws, or which possess a sanguinary penal code; the military spirit, and military governments; republican and democratic constitutions; political commotions, revolutions, and catastrophes — especially at their breaking out, or after the state of excitation and turbulence has passed away; religious fanaticism, and still more the want of religion; superstitious doctrines; unsound religious and philosophical opinions; depraved states of society, of manners, and customs.

614. *C. Causes most influential in this and other free and commercial countries.* — The range given to the social passions; the hazards and losses in mercantile speculations in the funds, and in joint-stock speculations and companies, and the consequent ruin and debasement of families; habits of dissipation, the indolence and ennui consequent upon wealth and sated enjoyment; the importance attached to public opinion, and the instability of that opinion; the violent shocks and collisions of opposing parties; the inactivity to which military and naval persons are reduced during times of peace; the enthusiasm of religious and philosophical sects; the immorality of the literature and scenic representations of the age; and the details of crime and of suicide, which constitute a principal part of the daily reading of all classes of the community.

615. iii. Pathology.—*A. The lesions observed in suicides upon dissection.* — These, in many cases, will necessarily be the same as have been already described in cases of manifest or fully developed insanity. In many instances, the lesions will have no reference to the production of this act; and, in some, they will be merely the consequences of previous disease, which had nothing to do with the subsequent occurrence of a suicidal impulse. The physical disease may have, in some cases, predisposed to the indulgence of a suicidal intention, by weakening the vital manifestations, and particularly the powers of mind; but, even in such cases, the mental emotion is to be looked upon as the efficient cause of the act. Without, however, attaching much importance to the influence of the structural alterations in producing it, as far as they have been yet investigated, unless when it is unequivocally dependent upon insanity, I shall briefly state those which have been most frequently noticed. Heister observed lesions of the liver, gall-bladder, and pancreas. Falret considers alterations of the liver to be rare; M. Esquirol remarked displacement of the colon; Osiander, congestion of the vessels of the brain, and chronic inflammation of the intestines; Corvisart, Alberti, and Osiander, diseases of the heart; Greding and Gall, thickening and condensation of the cranial bones; Home, dilatation of the sinuses of the dura mater, and effusion of serum in the ventricles, and between the membranes; Recamier and others, thickening of

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* The small number of suicides by poison, in the tables furnished by Caspar and Esquirol, deserves remark. On the Continent, it is very difficult to procure poisonous substances unless by means of a physician's prescription. In this country, a child or any wretch may procure them for purposes of murder or suicide, without any difficulty and at the lowest prices, at all the shops with very few exceptions where drugs and medicines are vended.

the arachnoid and dura mater, with ossific depositions in the latter; Falret and Foville, traces of vascular irritation and excitement in the membranes and substance of the brain; and Frank and Esquirol have failed, in many instances, to detect any appreciable lesion of any organ. From 1333 inspections of suicides, the following results have been given, but with little appearance of precision or accuracy: — Thickening of the cranial bones in 150; bony excrescences from their inner surface in 50; disease of the membranes of the brain in 170; inflammatory appearances of the brain in 90; simple congestion of the brain in 300; tumours in the brain in 10; softening of the brain in 100; disease of the lungs in 100; lesions of the heart in 10; disease of the stomach in 100; alterations of the liver in 80; lesions of the intestines in 50; suppression of the natural secretions in 15; syphilitic disease in 8; and no apparent structural change in 100. (See § 223. *et seq.*)

616. B. *Physiological Pathology.* — Suicide may be viewed, in many cases, even when proceeding from passion and feeling, as the result of deranged action of the vessels of the encephalon and of its membranes, consequent upon altered sensation or excited emotion; but it cannot be considered as essentially and exclusively depending upon this pathological cause. The intellectual and moral phenomena, which either directly or indirectly give rise to the suicidal determination, cannot be shown to be always the consequence of vascular lesion, or even of excited vascular action; although they often lead to such lesion, from the intimate connection existing between the mental manifestations and the organic actions. The numerous instances in which suicide is attempted, from ebullitions of temper or gusts of passion or feeling, and in which the means of self-destruction fail of accomplishing the intended end, leaving those who made the attempt calm, resigned, and happy at having failed in their intentions, fully prove the absence of established vascular lesion; and show the remarkable difference between these and cases depending upon real and confirmed insanity, which we never find so immediately and permanently cured, as those instances of attempted suicide fortunately are, and cured by the same means as so generally fail in every form of suicide proceeding from manifest insanity, wherein, it may be presumed, that lesion of vascular action in the encephalon, as well as of organic nervous power, actually exists. We are therefore obliged to conclude, that mental power may be, *hereditarily* or *originally*, or from the influence of the *predisposing causes* of suicide, so weak, or so morbidly impressible or susceptible, as to give way to the impulses to this act, arising out of any of its exciting causes, either before the controlling powers of mind have had time to re-act and to resist the suicidal impulse, or from the circumstance of those powers having been so weakened as to be incapable of sufficiently resisting this impulse when excited by powerful or by combined causes. In these cases, this act is to be imputed to the state of mental energy — to a constitution of the mind arising out of hereditary conformation, and the prolonged operation of predisposing circumstances, rather than to any appreciable disorder of the cerebral circulation.

617. On the other hand, it ought to be admitted, that incessant application to study, to business, to political events, to the views and interests of parties and sects, to the discharge of public duties, or to the support of public measures, as well as many of the numerous causes above specified, will so far overturn the equilibrium of the circulation, as to occasion an erethism of the vessels of the brain and its membranes, verging upon inflammation, if not actually amounting to it. Such a condition of this organ may betray itself by a slight delirium, or partial or slight form of mental alienation, by general irritation or nervousness, or by slight fever, or by burning headach, with little other disturbance of the system; or it may evince itself by a peculiarity of manner, by the unusual direction of ideas, or by the state of temper and feelings. If, during this condition of disorder, the ideas should be led to self-destruction, or if any circumstance, whether domestic or public, should occur, which, by exciting the temper or affections, may suddenly increase the cerebral disorder, as well as the consequent morbid ideas or resolution, suicide may be attempted: or if, either after or before the ideas prompting to this act have suggested themselves, the individual should be placed in a state of comparative inactivity, and his ideas be allowed to flow in a direction most likely to suggest or to confirm the resolution to resort to self-murder, the event, although more maturely contemplated, may not be the less certainly accomplished.

618. Suicide, viewed in this direction — the only one in which it can be considered with propriety as a physical disease, — may be attempted by the strongest and most accomplished minds; although much less frequently than by others educated without just principles, and undisciplined in the school of difficulty, disappointment, and misfortune. It is, under these circumstances, like other mental alienations, the result of vascular disorder in an organ intimately connected with the intellectual and moral manifestations. We cannot, therefore, be surprised that persons, subjected to the most important and harassing duties, and undertakings, and anxieties, should suffer in that organ which is the medium or instrument of these distracting operations; and that the consequences resulting from them, both to the organ itself, and to the faculties related to it, should be exactly those, which these causes are most likely, both from theory and experience, to produce.

619. C. *Is there a Suicidal Monomania?*—M. Andral remarks, that " man is sometimes possessed by a sentiment which tends to self-destruction. This feeling is designated '*Suicidal Monomania.*' It is not always the result of mental alienation: some persons put an end to their existence, who are not monomaniacs," &c. Now, this is a contradiction both in terms and meaning, not very consistent with the reputation which this writer has obtained in this country. After what has already been stated, it will be evident that suicide is either the result of some form or other of general or partial insanity; or of some state of excessive passion or feeling, which does not, in the usual acceptation of the term, amount to insanity, — although such passion or feeling may, at the moment, as completely overpower reason and self-control, as any form of monomania. If moral insanity, which I have described above, as constituting a form of partial insanity, be further ex-

tended than I have ventured upon, — and, instead of being confined to those moral states of aberration, which either are slowly developed, or are pertinaciously entertained, or both, be made to comprise those momentary states of excessive passion or feeling, which are suddenly excited by intense moral causes, and which, in well regulated minds, soon subside, without any very appreciable impairment of reason and self-control, but which, in impressible minds unaccustomed to control, to disappointments, to losses, and distraction, often give occasion to insanity or suicide, — then those cases of this act, that thus originate, and that seem the least of all dependent upon insanity, may be considered as actually the result of the insane state; and to these, the term suicidal monomania, or any other equally expressive of the insane condition, may be applied. But, if we thus extend the meaning of moral insanity, we must stretch it still further, and make it comprise also every act of passion or anger, — even the act of just indignation roused by insult; especially when insult is repelled by a retributive blow which may endanger the life of the aggressor. It may be granted that, in a few cases, suicide is the first symptom of insanity; the patient having been previously undisordered in mind. But this is an assumption rarely admitting of proof, unless where the act has been attempted only, and not carried into effect, — other insane acts being afterwards committed. M. ANDRAL, as just noticed, admits that persons destroy themselves as the result of other circumstances than the want of reason; and yet he terms suicide thus occasioned, a form of partial insanity, and designates it "suicidal monomania." Self-murder may depend upon many grades of insanity, and may, as I have shown, be the consequence of the several forms of moral insanity; but, when no degree of this malady is manifest beyond this act, it would be more correct to view it as the consequence of intense passion or feeling, — the impulse to self-destruction arising out of these emotions overpowering, for the moment, the dictates of reason, and the control of the judgment. According to this view, the term here used may still be said to be appropriate; and it may be allowed to be so, if the word insanity be extended to the utmost, so as to comprise the momentary impulses of passion, feeling, and mental depression. Suicide committed, or even attempted, in such circumstances, may then be viewed as a proof of insanity, or be considered as a form of moral insanity, or, as M. ANDRAL has done, with various contradictions of himself, as a monomania, — the aberration of mind consisting only of the impulse to self-destruction. If, on the other hand, *insanity* is to be viewed in a less comprehensive sense, — if it is *not* to be extended to those momentary impulses of excited or depressed passion and feeling, which lead to acts of violence against others or ourselves, and which only for a time overpower reason and judgment, — then suicide committed or attempted in the circumstances referred to, cannot be justly viewed in the above light; but should be looked upon as an act of passion, that, like other violent acts, cannot, consistently with good morals, or even with the safety of society, be treated as an insane act. In the forms of moral insanity noticed above (§ 69. *et. seq.*), it has been shown that, in addition to its more or less gradual developement, the moral aberration is generally pertinaciously adhered to; and that, when suicide follows, the connection of this act with such aberration, and with impairment of the mental powers, is very obvious: but, where disorder of the moral manifestations, or of the judgment, is not apparent, suicide being attempted, from a desire to escape the punishment of crime, or from humiliations of any kind, or from intense passion, distraction, or depression suddenly excited — from some moral shock, the dependence of this act upon a state of mind actually insane is not so manifest; and it will be to the benefit of the community not to consider it, in such circumstances, as the result of insanity. Numerous instances have been recorded, of persons who have had recourse to suicide from imitation or fascination — from the mental infection, caused by the self-murder of some one, however little noted for station, or character. In such cases, a predisposition to this crime may have already existed, or circumstances may have occurred to favour the suggestion of ideas of self-destruction; the suicidal disposition being confirmed, or determined, by perusing the details of this act generally so lavishly furnished by the daily and weekly prints. In some of those occasions of imitative or epidemic suicide, the moral infection has been arrested by inflicting unusual indignities on the bodies of those who perpetrated the crime; thereby showing that this act was not, as respected many of the cases which occurred in these circumstances, altogether the result of the absence of reason, or that the persons who had committed it could not be accounted irresponsible agents.

620. iv. PROGNOSIS. — The suicidal determination is generally removed with difficulty; and more especially when it is consequent upon any of the forms of moral and partial insanity, or is connected with chronic mania. In the advanced stages of melancholia particularly, as well as in several other states of both partial and general alienation of mind, the determination to commit suicide may be concealed, frequently in so artful a manner as to lull the suspicions of the most careful attendants; but it is never removed, unless the mental disorder, of which it is the associate, be altogether cured; and even in this latter case, the incipient return of insanity, or even the occurrence of some of the symptoms usually preceding its return, may be attended by the suicidal attempt. When suicide, however, is the consequence of violent passion and feeling, — of some shock which the mind is incapable of enduring at the time, — when it proceeds from temporary causes, and more especially where the attempt has been made when the mind has been subjected to the first impression of the *direct occasional causes* (§ 611.), and when the *predisposing causes* are not powerful, nor retain their influence in the mind, — then well grounded hopes of the removal of an inclination to suicide may be entertained. When this act has been attempted from causes favouring an unusual determination of blood to the head, or erethysm of the capillary circulation of the brain, — as violent mental excitement, controversy, distraction, or intense mental exertion, the violent shocks of revolution, or the collision of opposing parties, &c., — then an appropriate physical treatment — especially that directed to the removal of increased action in the brain, and of interrupted secretion and excretion — will generally

also remove every disposition to a repetition of the attempt; unless, indeed, similar exciting causes again come in operation. In all cases of attempted suicide from powerful passion or feelings, the possibility of some form of insanity, particularly melancholia and mania, being soon afterwards developed, should be anticipated — and the more especially, if mental disorder, or a suicidal propensity, has appeared in any of the members of the patient's family. In families thus circumstanced, the suicidal attempt is sometimes the first manifestation of insanity.

621. v. TREATMENT.—The treatment of a suicidal disposition, in most cases, and especially in those which are connected with the more obvious manifestations of partial or general insanity, is to be conducted on nearly the same principles as have been explained with reference to these states of disease. In such cases, the suicidal determination is only a part of the disorder, requiring the increased care of the attendants, and greater caution on the part of the medical advisers, particularly during apparent convalescence and recovery; and the strictest precautions against a return of the malady, and upon the appearance of symptoms usually preceding this occurrence; but in other respects demanding little or no modification of the physical and moral means of cure, already advised for the several forms of mental disease. The few observations, therefore, which it will be necessary to offer on the treatment of the suicidal impulse or disposition, may be divided into those which refer — 1st, to the careful removal of the circumstances which suggested or occasioned it; — 2dly, to the physical means which should be resorted to; — and, 3dly, to the preservative measures, or means of repression, moral and legislative, which may be instituted.

622. *A.* The *avoidance or removal of the circumstances or causes*, which suggested or occasioned the suicidal attempt, is the basis on which both physical and moral means of cure must necessarily be placed. This end, however, cannot always, or even generally, be attained; particularly where certain events have produced a powerful or morbid impression on the patient's mind; or where the attempt has proceeded from an insane delusion. Under the former circumstances, we can only endeavour to counteract, or to weaken, the emotion produced: in the latter case, the delusion will disappear only upon the removal of the mental disease. A knowledge of the several occasions of the suicidal determination will sometimes enable the physician to recommend means to neutralise their injurious influence, even when he finds that the patient is incapable of escaping from their baneful influence on his mind.

623. *B.* The *physical means of cure* should be directed chiefly with reference to the symptoms indicating the condition of the circulation in the brain, and the state of organic nervous power. These symptoms should be carefully investigated, and considered in connection with the phenomena more intimately connected with the suicidal impulse, and with mental disorder. If the impulse has followed any of the states of moral insanity, or melancholia, or other forms of alienation, the treatment, physical and moral, is altogether the same as already described; stricter precautions during the treatment, and upon the restoration of the patient to society, being requisite. In many of these cases, particularly those depending upon melancholia, and where the suicidal determination has appeared in consequence of the circumstances which have been shown generally to occasion increased action of the cerebral vessels, and of violent passion, chagrin, or distraction, general or local *vascular depletion*, *purgatives*, *refrigerants*, and *derivatives* are requisite. The pain, tension, or constriction, and uneasiness so frequently experienced in the head; the disordered action of the carotids and cerebral vessels, and the appearance of the eyes; the temperature of the scalp; and the changes frequently observed after death, — all evince the propriety of repeated bloodlettings, especially in the immediate vicinity of the brain, or of the hæmorrhoidal vessels. Cold affusions on the head, cold applications, the shower bath; purgatives conjoined with sedatives and repressants; refrigerants with diaphoretics; occasionally powerful or deobstruent cathartics, and sometimes emetics; anodynes with antispasmodics; dry cupping, setons, blisters, or other derivative applications on the nape of the neck, or on the hypochondria; and, after depletions and deobstruent evacuants, restoratives and tonics, — constitute, in such cases, the chief physical means of cure; but they require to be varied appropriately to the peculiarities of individual cases, and to be aided by hygeienic and moral measures, according to the circumstances or motives occasioning the suicidal attempt, and the form of insanity of which it may have been a manifestation. In most instances, however, exercise in the open air, manual and mental occupations, travelling, active amusements, hunting and horseback exercise, visiting watering places, &c., living in a dry and equable atmosphere, change of air and of scene, and the moral influences (§ 500. *et seq.*) already fully described, should be brought in aid of the more strictly medical agents.

624. After vascular depletions, where they are indicated, *emetics*, even a repetition of them, are often of great service, where the suicidal propensity has recently appeared; and, if much biliary disorder is present, a dose of *calomel*, followed by *stomachic purgatives*, and subsequently by *restoratives* and *antispasmodics*, as the preparations of valerian, will often be useful. *Warm bathing*, and cold sponging the head during the bath, or the *cold affusion* on the head; and the *shower bath* every morning, the feet being immersed in warm water; are also important, and generally appropriate remedies. The suicidal determination is very frequently associated with, and sometimes the consequence of, prolonged sleeplessness, arising from the remote causes of the mental affection. In these cases, a recourse to *narcotics* becomes requisite; the selection and combination of them, as well as the particular indications connected with the use of them, being guided by the principles already explained (§ 475. *et seq.*)

625. *C. Surveillance and restraint.*—Whenever a suicidal propensity appears, the disease should be treated, as respects *seclusion* and *control*, in every respect as above recommended (§ 388. *et seq.*); and the patient be placed in the charge of an experienced and vigilant attendant. Care should be taken to remove from his person and apartment, every article, by means of which he may carry his design into execution; and the windows, doors, &c. should be secured. Even

the bed-clothes should be carefully examined, lest portions of them should be torn off, for the purpose of self-strangulation. Although melancholic and other insane persons are not so likely to attempt suicide when others are present, as when alone; yet, the former circumstance is not always sufficient to deter them from it. Dr. BURROWS adduces an instance, in which a medical man, whilst another person was present, attempted to open the femoral artery with a penknife. His father and grandfather had both destroyed themselves. He had never met with any circumstance to occasion him particular disquietude; but, at the age of forty-five, he became dyspeptic, low-spirited, and listless. He expressed extreme sorrow for the attempt on his life; yet, in three or four days, he seized a razor from the dressing table, whilst his keeper's back was turned, and at one stroke divided one of the carotid arteries.

626. A person who has once entertained a suicidal propensity, should not be confided in, however strongly he may express his regrets at having made an attempt to carry it into effect, as long as the feelings continue, either more than usually blunted, or morbidly sensitive, — whilst the bearing of the patient continues embarrassed or perturbated, or his ideas confused, unsettled, or disturbed. If he complain of heats and flushings in various parts of his body, or partial sweats; and especially if his nights are sleepless; if he cannot look the person whom he addresses fully in the face with a firm expression; and if his eyes betray timidity, fearfulness, distrust, and restlessness; — other attempts will be made. Although the patient may have recovered his serenity of mind, a return of these indications ought to call for the most watchful solicitude from the medical and other attendants; for, although the patient may not seem to entertain any ideas of suicide, or may actually not feel any inclination to commit the act, yet the occurrence of an opportunity, or the accidental sight of an instrument of self-destruction, may give rise to the impulse, which may instantly be carried into fatal effect.

627. Whenever a great calamity has overtaken a person of weak resolution, of the melancholic, nervous, or irritable temperament, and especially if insanity or suicide have occurred in any branch of his family, — particularly if the affliction is sudden or recent, and productive of great mental distress, or of singularity of conduct or conversation,—the probability of his attempting suicide ought not to be overlooked. The design, however, in these circumstances, may be concealed from superficial observers; but the physician will detect, in the expression of the eyes and looks, in the suppressed struggle to conceal his emotions, in the constrained respiration, and the accelerated, excited, or irregular pulse, sufficient causes to require the utmost vigilance on the parts of both friends and attendants. In such cases, the previous character and fortitude of the patient may lull every fear; but the greatest talents, and the strongest minds, have yielded to intense emotion. The moral character and disposition of the patient may have been changed, before the suicidal propensity was developed; many of the circumstances, to which this propensity had been directly imputed, actually occasioning a state of moral or partial insanity, of which the suicidal intention was only an attendant or consequence. Moreover, character and disposition only should not afford any grounds of confidence in persons subjected to the more intense emotions, or to the more energetic occasions of this act; more especially if they have not formerly experienced events requiring the exertion of mental energy and fortitude. Many men, eminent for talent and excellence of disposition, have committed suicide, when overtaken by adversity. Several instances of this kind occurred, during an early part of the present century, in this country; and have been adduced by some writers, as proofs of the strongest minds being liable to give way to the suicidal impulse. But eminence and talent are distinct from fortitude in adversity; and even from that constitution of mind, to which the terms strength of mind or force of character have been applied. It is doubtful how far these persons were really possessed of these latter characteristics; inasmuch as they are usually acquired, in combating difficulties, in patiently bearing adversity and disappointments, and in controlling the more poignant emotions which difficulty and adversity call forth. In this school, where true force of character and fortitude are chiefly, if not only, to be acquired, these persons may not have been sufficiently disciplined; for, when the course of prosperity has been uninterrupted and rapid, however eminent the abilities which have contributed to it may have been, sudden adversity may endanger the perfect sanity or fortitude of a mind, unaccustomed to sustain, and unprepared to meet, its shock.

628. There is no part of a physician's duty which is so difficult, as Dr. BURROWS has remarked, as to decide upon the exact time when he may place confidence in a convalescent suicide. If this confidence be yielded prematurely, the act, which time and great care had been employed to avert, may be immediately perpetrated; whilst, if it be withheld when the patient feels that he has been labouring under a delusion, the effect may be such as to endanger a return of his delusion, or of the suicidal propensity.

629. When the suicidal determination cannot be carried into effect by any other means, owing to the care of the attendants, the patient sometimes determines to starve himself. Management may do much in overcoming this intention. Kind entreaties and stratagems may be resorted to; and tempting articles may be set before him, or left within his reach, without any further notice. If he partake of it, no remark should be made, but the same course pursued. If these means fail, the stomach-pump ought to be resorted to.

630. M. FALRET observes, that noisy or immoderate gaiety irritates melancholic suicides, or, at best, affords only a transient pleasure, followed by increased misery. He states, that he has accompanied these persons to the theatre, and to the hospitals, in order to compare the effects produced upon them by these opposite spectacles; and he has found, that visits to the really afflicted were most useful, by suggesting the idea, that others had still greater cause than they of being unhappy.

631. *D.* PREVENTION AND REPRESSION. — The increasing frequency of suicide, as well as of manifest insanity, requires some notice of the means by which it may be, in some measure, repressed, although no sanguine hopes of success from them can rationally be entertained in the present states

of society. As long as education, manners, morals, and social intercourse continue as they now are — as long as crimes, murders, and suicides are seductively detailed and daily furnished to the public, through a thousand channels, for the purposes of private gain — as long as the perpetrators of crimes and of homicides are held out, both on the stage and from the press, as heroes of their day — as long as the overthrow of moral and religious principles, and the infection or contamination of the public mind, are made objects of gainful speculation, into which persons in place or authority are not considered dishonoured by entering — as long as the streams of moral pollution are allowed to flow without either strenuous, or well-directed, or combined efforts to confine or to counteract them — as long as the most instant and efficient agents of self-destruction are openly sold in every street, at little or no price, and to any purchaser, without either "let or hindrance" — as long as the struggles of great parties in politics and religion absorb, in connection with the details of every vice and every crime, the public mind, each party endeavouring to depress and ruin the others, without regard to the general weal — as long as provision for the pecuniary wants of the state, and the power and patronage of office, constitute the chief objects of governments — as long as justice is within the reach only of the wealthy, as laws protect chiefly the bad, as the weak are unshielded, and the deserving unrewarded — as long as

—— "The whips and scorns of time,
The oppressor's wrong, the proud man's contumely,
The pangs of despised love, the law's delay,
The insolence of office, and the spurns
That patient merit of the unworthy takes,"

shall continue to "puzzle the will" — as long as the lives of all classes are endangered, and their minds distracted, by unprincipled and ignorant pretenders to medical and religious knowledge, who are allowed, and even encouraged, to take advantage of the credulity and fears of the weak-minded — as long, in short, as moral degradation and physical destitution exist, and as long as the safety of the people is *not* the supreme law of the state — as long as these several conditions of a country continue, and in proportion to their separate and combined influence — so long will suicides be frequent or even increase.

632. The history of all nations has demonstrated the prevalence of this act, both as a disease and as a psychological phenomenon, during periods of surpassing luxury, of criminal debasement, of public commotion*, and of the decline of public and private spirit and virtue. In such circumstances, laws directed simply to this act, and without reference to the sources of the evil — to the various contaminating moral agents, poisoning the minds of the community — will be of but little avail. It is obvious, that laws which, as at present, affect only the property of the suicide, are unjust, as they cannot punish the guilty, but fall exclusively on the innocent — on those already punished by the act of the suicide. The only means of *prevention* which have been found to succeed, on occasions of epidemic or imitative suicides, have been such as tended to impress the ignorant with the moral and religious turpitude of the act, to influence public opinion in its reprobation, and to convince the perpetrator of the crime, that, although he escapes from feeling the punishment it merits, every indignity, which is compatible with the good of society, will, as a consequence, be offered to his body, and to his memory. Each member of the community lives not for himself alone, but for the common weal, and in order to contribute to the general, the mutual, the public, and the private support, requisite to the healthful constitution of society. As it is the chief purpose of good government to preserve inviolate this principle of existence in all associated communities, so ought every effort to contravene it, or to escape from the responsibilities it involves, to be repressed and punished in ways the most effectual, conformably with the spirit in which only should punishment be inflicted; and even those, who either directly or indirectly aid in the commission of this act, should be subjected to punishment. The difficulty, however, is to determine upon measures which may have any influence in diminishing the number of suicides, who are either irresponsible agents, or are in that state of mind which is uninfluenced by worldly considerations. There is every reason to believe, nevertheless, that many of those who commit this act without being manifestly insane — who entertain a suicidal propensity from depression of spirits; from mortified pride; from domestic chagrin or irritation; from excessive passion or feeling; from imitation, fascination, or mental infection; from extreme profligacy, debauchery, and satiety, &c., — would be deterred from it by the conviction that, if they perpetrated this crime, some indignity to their bodies, and disgrace to their memories, would be the result. If it were enacted that the body of a suicide, who had not evinced sufficient proof of previous insanity to require restraint, or whose relations had not seen sufficient proof of mental disorder to obtain medical aid, or other assistance requisite to the protection of others as well as of himself, should be made subservient to medical instruction, and consequently to the general weal, — I am confident that the number of suicides would diminish, notwithstanding the increased, and increasing, sources of mental contamination, and of mental disease. Means of repression directed to the property of a suicide would have little avail, and would, moreover, punish the innocent, without affecting the guilty; but such means ought to be strenuously directed against those who deal in poisonous substances, and ought to be rendered so stringent as entirely to prevent such substances from being procured unless by means of a physician's or surgeon's order or prescription. It is well known, that suicide is often committed in moments of irritation or passion, and that as soon as the feeling subsides — in the course even of a few minutes — the suicidal impulse or intention may cease to influence volition so powerfully as to lead to the commission of the act. Therefore, if difficulties were thrown in the way of resorting to it, during periods of irritation and suicidal impulse, it might not afterwards be entertained, or the sober mind would recoil with so great horror

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* In the summer of 1793, upwards of 1300 suicides were committed in Versailles and its vicinity! During "the reign of terror," or rather of crime, suicides were committed by the guilty, by the terrified, by infidels, and contemners of moral and religious principles, by public and private criminals, and by those distracted by losses of fortune and friends, in unheard of numbers, throughout France.

from the morbid idea, as to view it with increased dislike, or would endeavour otherwise to fortify or to protect itself against a return of the propensity.

633. Having thrown out these hints as to the only means of repression which can be suggested, after a consideration of those which have been enacted in this and in foreign countries, I would merely add, that the growing frequency of suicide requires that means, direct and indirect, should be taken by the legislature to restrain it. As, however, many of the most influential causes of suicide can only be indirectly affected by legislative measures, and as some of these causes belong to the liberty enjoyed by all classes, although appertaining chiefly to the most worthless parts of that liberty, but little hope can reasonably be entertained that the frequency of this act will be much diminished, — as long, at least, as the circumstances arising out of the education, morals, amusements, and social relations of the community, to which it is in great measure referrible, continue unchanged.

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INTESTINE — Syn. Ἔντερον (ab ἐντὸς, intus) — Intestinum (from intus, within). — *Intestin*, *Boyeau*, Fr. *Darm*, Ger. *Intestino*, Ital. — *Bowel*; *Gut*; *Intestinal Canal*; *Intestinal Tube*.

1. Most of the *disorders* and *structural diseases* to which the *intestines*, in general, are liable, are discussed in appropriate articles. The seat and nature of these affections required a separate consideration for them; and, at this place, it remains for me chiefly to supply whatever I may have omitted in these articles, and to treat of those subjects, which have not been entered upon under different and more appropriate heads.

2. It need hardly be stated, that the intestines comprise, or consist of the following parts, descending from the stomach to the verge of the anus, namely, the *duodenum*, the *jejunum*, the *ilium*, the *cæcum*, the *colon*, and the *rectum*. As each of these portions of the intestinal canal presents most important connections with, and relations to, other viscera, that are not possessed to an equal degree, or in a similar manner, by the others; as they are, in many respects, and particularly as regards certain of their functions, distinct organs; and as they are often severally the seats of disorders, more or less limited to either of them, so I have treated of the diseases to which each of these portions of the intestinal canal are most liable, under their respective heads. As there are certain maladies, which affect, in some degree or other, more than one of these distinct portions of the bowels, and which often implicate, or even originate in, some one or more of the collatitious viscera, and in which not only the intestines, but the various related viscera, and even the frame generally, frequently are also disordered, although in different grades and forms, and to a varied extent, according to numerous circumstances connected with the cause of the disease, and state and constitution of the individual attacked, so I have treated of these maladies under the names commonly applied to them, but with strict reference to their seats, natures, and pathological relations. Thus, whilst I have considered the diseases individually seated chiefly in either the *duodenum*, *cæcum*, *colon*, &c., under these heads respectively, I have likewise discussed *colic* and *ileus*, *costiveness* and *constipation*, *diarrhœa*, *cholera*, *dysentery*, *gastro-enteric disease*, *flatulency*, *intestinal hæmorrhage*, *intestinal concretions*, and *worms*, &c., in these several articles, because these complaints are not limited, in their seats, to one portion of the intestinal canal only, but often extend to several portions of it, although in different grades, and frequently depend upon disorder of the adjoining viscera, and sometimes even of distant organs, and of the system in general. Moreover, as the *organic lesions* which occur in the intestines are not peculiar to any one portion, but extend, in different maladies and persons, and in different degrees of frequency and severity, to all of them, and even also to the stomach and œsophagus — to the whole digestive canal from the lips to the anus — so I have considered these lesions under the head "Digestive Canal," and have thereby avoided the repetitions, into which I should otherwise have been betrayed. It here chiefly remains for me to consider those maladies, seated principally in the *small* and *large intestines* — in the *ileum*, *jeju-*

num, and *colon*, — that are not discussed under different or more appropriate heads. The *functional disorders*, and the *structural changes*, to which the *intestines* are liable, being fully treated of in the articles just mentioned, I now proceed to consider chiefly their *inflammatory diseases*. In the article on the *peritoneum*, however, much will be found more or less intimately connected with inflammations of both the small and large intestines, to which sufficient reference will be also made in those sections, where inflammation extending to the peritoneal coat of the bowels, and the complications of enteritis, are considered.

I. Inflammation of the Small Intestines.— Syn. Χόρδαψος, Εἰλεὸς, Aretæus, Galen.— *Febris intestinorum inflammatoria*, Hoffmann. *Intestinorum Inflammatio*, Boerhaave. *Enteritis*, Sauvages, Vogel, Sagar, Cullen, Pinel. *Empresma Enteritis*, Good. *Cauma Enteritis*, Young. *Gedärmentzündung*, *Entzündung der Gedärme*, *E. der Därmen*, Germ. *Entérite*, *Inflammation des Boyaux*, Fr. *Inflammazione d'Intestini*, Ital. *Inflammation of the Bowels*.

Classif. — 1. *Class*, Febrile Diseases; 2. *Order*, Inflammations (*Cullen*). 1. *Class*, Diseases of the sanguineous Function; 2. *Order*, Inflammations (*Good*). III. Class, I. Order (*Author* in *Preface*).

3. Defin. — *Tenderness or pain of the more central parts of the abdomen, increased on pressure, generally with symptomatic fever, disordered defæcation, and frequently nausea and vomiting*.

4. Inflammation generally commences in one only of the constituent tissues of the small intestines, and frequently continues to be thus limited during its course; but it frequently also extends to the other parts, until even all the textures forming a portion of intestine are implicated. Thus the glandular apparatus, or the mucous membrane only may be inflamed, and the disease may not extend further, although it may exist long, or be extremely acute: but it often, also, invades the other tissues, more especially the connecting cellular tissue, until the peritoneal coat is at last inflamed, and all the phenomena of circumscribed or diffused peritonitis is produced. When all the constituent tissues of a portion of intestine are affected, the inflammation usually has commenced and proceeded in this manner; for it is but seldom that there is reason to infer that the inflammation has either simultaneously invaded all the coats composing a portion of bowel, or has proceeded in an opposite direction, namely, from the peritoneal to the other coats; unless, indeed, in cases of external injury, or of strangulated hernia, or when the inflammation has extended from adjoining parts to the intestines.

5. Inflammation of the intestines, whether limited to one only, or implicating two, or all, of their constituent tissues, may assume any grade of *intensity* and *acuteness*, from the *most acute* down to the *slightest degree* and the *most chronic form*. It may appear, in either of these states, as a *simple* or uncomplicated disease, or *associated* with other maladies. In this latter state, it may be either *primary* or *idiopathic*, or *consecutive* or *symptomatic*. In each of the above forms it will be here considered.

6. i. Inflammation of the Mucous Surface of the Intestines.—*Muco-Enteritis*, of Armstrong. — *Muco-Entérite*, *Entérite Villeuse*, of French pathologists. — This complaint varies in its *characters* with its *intensity*, and with the temperament and habit of body of the patient; a slighter grade of it often causing, in irritable, nervous, and plethoric persons, more acute symptoms than a severer degree in those who are melancholic or leucophlegmatic. The *symptoms*, moreover, are further varied by the extension of the inflammatory affection, in some degree to the duodenal or gastric villous surface on the one hand, or to the internal surface of the cæcum and colon on the other; for the mucous coat of the small intestines is inflamed more frequently in conjunction with one or more of these than in an unassociated form; and not infrequently some one of the adjoining viscera is also more or less disordered. Indeed, the enteric disease may be altogether consecutive of, and caused by, derangement of one or other of these viscera. Thus a discharge of acrid or otherwise morbid bile into the duodenum may occasion or perpetuate inflammation of the mucous surface of the intestines, and often also of the large bowels.

7. *A. Symptoms.* — *a.* In the *acute* or *sub-acute* states of the complaint, the abdomen is usually distended, sometimes tense, and flatulent. A dull or heavy deep-seated pain, or soreness, occasionally with a sense of heat, is felt upon firm pressure, especially around the umbilicus, or towards the right iliac region; but this latter symptom is often absent, and is more generally found when the follicular glands are affected. In the more acute cases, the abdominal parietes are warmer than other parts of the body; and a feeling of internal heat of the bowels is also often complained of, with colicky pains, particularly after cold drinks, and the more heating or indigestible articles of food. Muscular power is much weakened, and the skin is harsh and dry. There is more or less thirst; and the appetite is impaired or lost. In severe cases, or when the disease is far advanced, there is often nausea or vomiting; this latter symptom depending much upon the extension of the affection to the internal surface of the duodenum and stomach. The alvine evacuations are generally morbid, sometimes too frequent, at other times too rare and scanty; but usually preceded or attended by flatulence, borborygmi, and the escape of much flatus. When the internal surface of the large bowels is unaffected, constipation is often present, but short attacks of diarrhœa, occasionally alternating with costiveness, frequently occur. The stools vary in colour and consistence with the state of the biliary functions and the kind of the ingesta: when there is diarrhœa, they are generally pale, yeasty, and crude, or insufficiently digested; when the bowels are costive, they are often offensive, dark, and scybalous. The urine is high-coloured and scanty, and often deposits a copious sediment. The mouth is clammy, with a bitter or unpleasant taste. The tongue is white or yellowish in the centre, but red at its point and edges. The pulse is accelerated, and generally small and soft when there is diarrhœa, and full, or even hard, when the bowels are confined.

8. In more intense or acute cases, the foregoing symptoms are more prominent. The abdominal distension amounts almost to tympanitis; the pulse is quick and constricted; the thirst is great; the tongue is furred, loaded, and dry; the

urine scanty and high-coloured, and all the secretions and excretions diminished. Pain, soreness, internal heat, and tenderness of the abdomen are greatly increased, and the surface is hot, dry, and harsh. The affection of the intestinal mucous surface extends its influence to the cerebro-spinal system, causing sleeplessness, restlessness, and ultimately, in the more unfavourable cases, delirium, startings of the tendons, and in young persons and children, especially, convulsions and coma. In many of these more severe attacks, particularly in the sanguineous temperament and plethoric habits, and in warm climates or seasons, the inflammatory affection of the mucous surface rapidly extends to the external coats of the part of the intestine chiefly diseased; and the form of enteritis about to be noticed (§ 30.) supervenes.

9. Acute muco-enteritis *commences* variously — sometimes slowly and insidiously, with impaired appetite, slight thirst, loaded or white tongue, a slight sense of heat in the abdomen, or colicky pains and slight disorder of the bowels. These symptoms, at first, are hardly appreciable, but they become gradually more and more severe, until the pulse and system become obviously affected. In other instances the attack is more sudden, and severer from the beginning, especially when caused by the more energetic causes, — errors of diet and regimen, by irritating ingesta or intoxicating fluids, by irritating purgatives, by exposure to cold, to currents of air, and by damp or wet clothes. In these latter circumstances especially, it is sometimes ushered in by chilliness or slight rigors. It not infrequently follows some one of the varieties of DIARRHŒA or of COLIC, especially the former, and is often attendant upon it; in such cases, however, the morbid action is seldom confined to the small intestine, but is extended also to the mucous surface of the large bowels.

10. The *progress* of muco-enteric inflammation is seldom very rapid, unless when caused by poisonous substances, and the most intense causes; and then dangerous cerebral symptoms often supervene, or the morbid action extends either to the adjoining portions of the alimentary canal, or to the more external tunics. Its duration most commonly varies from three or four days to thirty or even forty; but thirteen or fourteen days may be said to be its medium continuance. It most commonly *terminates* in resolution, but when neglected, or improperly treated, and in faulty states of the constitution, it often passes into the chronic form (§ 11.) or extends to the other tissues of the intestines, or to the adjoining viscera. A fatal issue generally is owing to this circumstance, or to consecutive affection of the brain, which latter is a frequent occurrence in children, especially in infants.

11. *b. Chronic inflammation of the mucous surface of the intestines* is characterised chiefly by the presence, generally in a slight degree, of the symptoms already enumerated, for a considerable time — for six or seven weeks, or even longer. It may have been consequent upon a more severe state of the disease, or it may have been slight from the commencement, and hence prolonged from this circumstance or from neglect. In many instances, little or no abdominal uneasiness, or pain, or heat, or flatulency, or distension, is felt until three or four hours after a meal. Chronic muco-enteritis is exasperated by indigestible articles of diet, by a heating regimen, warm condiments, and by stimulants. Thirst, dryness of the lips and mouth; harshness and dryness of the skin; flatulency, borborygmi, and costiveness, the motions being scybalous, dry and dark, sometimes alternating with slight diarrhœa; abdominal distension during digestion, and slight evening fever, are generally complained of. The occurrence of abdominal pain, tenderness, thirst, heat of skin, acceleration of pulse, and lassitude, after the principal meal, imparts to the complaint an intermittent or remittent character, which may mislead an inexperienced practitioner. In some cases soreness and fissures of the lips, with exfoliation of the epithelium, are observable, and the cuticle often is thrown off in minute pulverulent scales.

12. *c. In children, muco-enteritis* is one of the complaints most frequently observed. It occurs in either an *acute*, *sub-acute*, or *chronic* form. In slighter as well as in severer states, it is common in the youngest *infants*, more especially in large or manufacturing towns, and in the more delicate subjects; in whom, however, the morbid action usually extends to the stomach on the one hand, and to the large bowels on the other, in a more or less marked form, at some period of its course. Indeed many of the *diseases of infancy and childhood* are merely consecutive upon neglected states of this complaint, more especially cerebral maladies and convulsions, infantile remittent fever, disorders of the liver, mesenteric obstructions and enlargements, peritonitis, scrofula, and diseases of the glands and joints.

13. *a. In infants* at the breast muco-enteritis may, even in the *acute* and *sub-acute* states, be attended by very little febrile disturbance. In them the symptoms vary with the parts of the digestive canal principally affected. When the small intestines are only implicated, there is generally vomiting, tympanitic distension of the abdomen, and tenderness upon firm pressure, with heat of skin, and slight or occasional diarrhœa. When the morbid action extends to the colon there is more severe or continued diarrhœa, much less abdominal distension and tenderness, and less frequent or no vomiting. In many cases of this class of patients an erythematous redness is observable around the anus. The tongue is dry, or loaded, and red at the point or edges, and sometimes over the whole surface. The stools are various, but frequently consist of a yellowish substance. There are also thirst, dryness of the skin, and agitation; but the pulse is often not much affected.

14. During the period of *dentition* infants are often attacked in a still more severe manner. In many the complaint commences insidiously with slight diarrhœa and flatulent distension of the abdomen, and proceeds in this manner for some time, until it assumes a well-marked form. The evacuations are occasionally not more frequent than usual; sometimes they are three, four, or five in the twenty-four hours, but they are loose, and more or less disordered; and all the local and constitutional symptoms are severe. In the fully developed state of the complaint there are heat of skin, fretfulness, thirst, dry tongue, disturbed sleep, sometimes vomiting, accelerated pulse, abdominal tenderness on firm pressure, and distension, crying and agitation before passing a stool, which is often forcibly ejected with much

flatus. The evacuations vary remarkably in the course of the disease, from a healthy to a clay-coloured, yeasty, pale, and slimy, or to a greenish, or brownish, or reddish, watery and dark state. They sometimes consist of a dark fluid; at other times, of a dark or reddish-brown mucus. Their appearance is, however, much influenced by the food and medicine taken, much of the former passing off in the stools, but little or not at all changed. This acute state of disease may continue for some time; but great exhaustion, rapid pulse, dry or crusted tongue, sunk eyes, pallid or waxen countenance, coma, and partial or general convulsions, frequently supervene and terminate existence. In infants and young children, this state of the disease may exist for a considerable time, and even with much severity, without fever being unequivocally developed. Vomiting, diarrhœa, colicky pains, flatulent distension of the abdomen, tenderness on firm pressure, and often increased heat, especially of the belly, are the symptoms which chiefly indicate, in this class of patients, the presence of acute muco-enteritis. Frequently the two first of these symptoms alternate.

15. In infants who are either prematurely *weaned*, or are attempted to be brought up by hand, or otherwise insufficiently or improperly fed, this complaint is very prevalent. Indeed, it is much more common than any other; and in it nearly all the other diseases, to which infants thus circumstanced are liable, actually originate; these arising consecutively in consequence of sympathetic disturbance, and the intimate connexion subsisting between the vital organs, by means of the organic nervous system. The complaint, commonly called the "*Weaning Brash,*" is merely a modification of acute muco-enteritis, in which the irritation of inappropriate or unaccustomed food not only induces a degree of inflammatory action, but also an increased secretion, this latter often, however, favouring the resolution of the morbid vascular action. In this complaint the essential symptoms are those just described, varying, however, in different cases, according as the inflammatory irritation is extended either to the stomach, in the form of GASTRO-ENTERITIS, or to the large bowels, in the form of ILEO-COLITIS, hereafter to be noticed. However modified this disease may be in children, by peculiarity of constitution, by combinations of the causes, and the extent or intensity of the morbid action, it has a most manifest influence, in all its forms, to induce sympathetic or consecutive inflammation of either the membranes or the substance of the brain, or even both, and disease of the mesenteric glands. After weaning or dentition, acute muco-enteritis sometimes assumes a form which is with difficulty distinguished from the acute variety of *Infantile Remittent Fever.* Indeed the one complaint often runs into the other; and the more severe state of the latter disease is frequently *complicated*, as will hereafter be shown, with the former, a fatal issue in these being generally owing to this complication.

16. *β. Chronic muco-enteritis* is also frequent in *infants* and young *children.* It is more generally attended by diarrhœa in them, than in adults; the dejections being glairy, watery, and greenish. The belly is tympanitic and large; and, as the disease continues, contrasts strongly with the emaciation of the extremities. About one or two hours after a meal, fretfulness or uneasiness with depression may be remarked, occasioned by an increase of ailment when the ingesta are passing along the ilium. There are also thirst, dryness of skin, and often increased heat of the abdomen, especially towards evening. The pulse is sometimes accelerated, and generally small and soft. Tenderness or soreness is frequently evinced upon firm pressure of the abdominal regions, or upon examination of them by *percussion.* This state of enteritis in children seldom continues long without super-inducing enlargement and obstruction of the mesenteric glands, and the usual consequences of these lesions. It is often also a *complication* of the more chronic states of *Infantile Remittent Fever*, and not infrequently the former complaint is mistaken for the latter, the exacerbations attending it arising from the effect of food upon the character of the symptoms, or from the constitutional effects of irritations of a vital organ, and the periodicity which the slighter forms of febrile action are prone to assume, especially when the local affection commences in a slight form and advances slowly.

17. ii. INFLAMMATION OF THE GLANDS OF THE INTESTINES. — *Glandular Enteritis* (Author). — *Entérite Folliculeuse*, of French writers. — Inflammation of the *solitary* and *aggregated* (PEYER'S) *glands* and of the *simple follicles* (LIEBERKÜHN'S) — is rarely observed as a primary disease, unless as a consequence of a peculiar class of causes, which operate not merely locally in respect of the alimentary canal, but also upon the system in general. It is scarcely ever a simple or an unassociated malady; but generally a consequence of an antecedent morbid condition, either of some other vital organ, or of the constitution — a result of an important lesion of the vital energy, and of the circulating and secreted fluids. *Follicular* or *glandular enteritis* is to be viewed rather as a *consecutive* or *symptomatic affection*, than as a primary and simple disease. Yet it has been considered by several pathologists, and particularly by MM. LOUIS, ROCHE, and others, as a primary malady, and the essence of the typhoid forms of fever. That it forms a most important complication of continued, and even of remittent, fevers is undoubted, as I have already shown (see FEVER, § 462.), especially in certain epidemics, and in those localities, where the causes which act more directly upon the alimentary canal cooperate with other predisposing and exciting causes of fever. Thus it was a most prominent feature in the epidemic *Mucous Fever* (see FEVER, § 406.), described by ROEDERER and WAGLER, and in that denominated by M. BRETONNEAU *dothinentérite*, and *ileo-dyclidite* by M. BAILLY. It is frequently observed in *adynamic*, *putro-adynamic*, and true *typhus* fevers, and is seldom absent when these fevers assume the enteric character or complication; and which they are prone to assume when they arise from those concurring or exciting causes, which either act injuriously on the alimentary canal, or contaminate the circulating fluids; as putrid food, water containing decayed animal or vegetable matter, &c. It exists also, but in connexion with inflammation of the follicular glands of the *cæcum*, *colon*, and *rectum*, in the adynamic forms of DYSENTERY § 20. *et seq.*), as will be more fully shown in the sequel. Glandular enteritis, occurring consecu-

tively of, or as a complication of low fevers (see Fevers, §§ 453. 474.), necessarily assumes, in its course and consequences, an acute character; but it also occurs consecutively of other diseases, more especially of tubercular consumption, of tubercles in various organs, and of scrofulous disease of the joints, bones, and glands; and in all these symptomatic relations it presents a chronic form.

18. In its *primary* and *simple states*, *glandular enteritis* cannot be advantageously viewed without reference to its special causes. These are, as respects *predisposition*, the female sex; the earlier epochs of life, particularly those antecedent to puberty; relaxed and lymphatic constitutions; the scrofulous diathesis; and persons possessing a fine white skin, a fair complexion, and light hair. The more *efficient* or *exciting causes* of follicular enteritis are also peculiar. These are a cold and humid atmosphere; low and damp localities; an air contaminated with vegetable and animal miasms; the use of water rendered impure by putrid animal or vegetable matters or exuviæ; immature, or stale, or decayed fruit or vegetables; animal food passing into a state of putridity or decay; all septic substances taken into the stomach; immature or spoilt, or musty wheat or rice; damaged or mouldy bread, biscuit, &c.; the prolonged use of purgatives, and whatever impairs vital power, and deteriorates the chyle and the circulating fluid. MM. Bretonneau, Leuret, and Gendron, consider that cases originating in one or more of these causes may generate an effluvium which may infect healthy persons. There can be no doubt that these causes, when they operate upon a number of predisposed persons, and in circumstances favourable to their injurious impression, and to the accumulation of the emanations proceeding from the diseased, will produce a disease capable of propagating itself in these circumstances; but the disease will either be dysentery, or fever with enteric complication, as shown in numerous instances, particularly where these circumstances have been aided by the endemic influences just alluded to, and by epidemic constitutions.

19. *A. Symptoms.*—*a.* In the *sporadic* and *simple* state of glandular or follicular enteritis, the patient frequently complains at first only of slight disorder of the digestive functions, consisting chiefly of want of appetite, colicky pains, and relaxation of the bowels, ceasing and recurring from time to time. There are also borborygmi, flatulence, mucous stools, a relish chiefly for the more stimulating articles of food, a white or loaded tongue, a soft and languid pulse, and a turbid state of the urine. In other cases the symptoms are more severe at the commencement. The appetite is lost; the tongue presents a greyish-white or a yellowish coating, and is somewhat red at its point and edges; the mouth is clammy, occasionally aphthous, with an insipid, sickly, nauseous, or sour taste; the breath is disagreeable and fœtid; and there is tenderness upon firm pressure around the navel. Borborygmi, and eructations of an acid and nidorous flatus; colicky pains often followed by flatulent and mucous evacuations, occasionally containing lumbrici; great depression of strength; dusky discoloration of the skin; occasional outbreaks of slight but acid perspiration; and a small, frequent, and feeble pulse, are generally also present at an early period. There is little or no heat of skin, and but little thirst. Shifting pains in the limbs are often felt. The urine is thick or turbid, and deposits a greyish or brick-coloured sediment. Diarrhœa is neither severe nor of any continuance, unless the glands of the large intestines are also affected.

20. *b.* In its more *acute* or *severe states*, the affection of the glands is seldom confined to the small intestines, or to the solitary glands, or to Peyer's glands, or to the simple follicles solely, although either may be chiefly diseased. In the more complicated cases, particularly those presenting the forms of adynamic fever and dysentery, Peyer's or the aggregate glands, are principally implicated: and the disease extends from the lower third of the ileum, where it is most prominently marked, to the simple follicles and solitary glands of the large bowels, on the one hand, and to those of the upper portions of the intestinal canal, on the other. In these more acute states, severe pain in the abdomen, often extending from the navel to the right iliac or cæcal region, and increased on pressure; a loaded tongue, with dryness of the mouth, and thirst; symptomatic fever which becomes increased towards evening, with a dry harsh skin; depression of spirits; disinclination to move; a dull and often a sunk state of the eyes, and discoloration of the lips and around the mouth, are usually present, and are commonly attended by fulness or flatulent distension of the abdomen in general, or more especially towards the cæcal region; by nausea and occasionally vomiting; and by frequent, mucous, offensive, ochrey or otherwise morbid stools, and scanty urine. As the disease proceeds, it usually assumes all the characters either of *Asthenic* Dysentery, or of *Mucous* or *Adynamic* Fever (see these articles), in a severe and more or less advanced form, according as the affection extends along the digestive canal, or gives rise to exhaustion of the cerebro-spinal functions, and to deterioration of the circulating and secreted fluids. When it assumes any of the forms of *Asthenic* or *Adynamic Dysentery* (see Dysentery, §§ 20. *et seq.*), the cæcum, colon, and rectum are especially implicated; and when it passes into adynamic fever, the aggregated glands, particularly in the lower third of the ilium, are extensively diseased, ulceration extending from them to the more external tissues.

21. *c.* Inflammation of the intestinal mucous follicles often assumes, particularly in low and humid localities, and when occurring epidemically or even endemically, as occasionally observed, especially on the Continent, either the form described under the article *Mucous* Fever, or that very closely resembling it, denominated by M. Petit *Entero-mesenteric Fever;* and which is described by him nearly as follows: — There are at first debility, general uneasiness, anorexia, irregular attacks of fever, and diarrhœa. The countenance is dejected, the eye dull, and the skin pale or slightly livid, particularly about the lips and near the alæ nasi; decubitus on the back; disinclination to motion; torpor, and some degree of prostration of the intellectual powers. The fever is slight or obscure during the day, but gradually comes on in evening paroxysms, without rigors or much heat, but with a dry harsh skin, injection of the eyes, and slight delirium. There is great

thirst; the teeth are dry; and the tongue is covered with a greyish paste. The stools are bilious or serous, variable in frequency and quantity, but are not such as to account for the prostration of the patient. The belly is soft and not swollen; and little or no pain is felt in it, unless on pressure towards the right side, between the umbilicus and the crest of the ilium. The symptoms are gradually increased; the lips and alæ nasi are slightly retracted; the cheeks become livid, the eyes sunk and injected, and somnolence and delirium constant, although the answers are correct, but painful. Continued fever, with nocturnal exacerbations, petechiæ, and subsultus tendinum now appear; the pulse is frequent, and very compressible; the teeth are covered by sordes, and the tongue with a brownish or black crust. The abdomen becomes more painful; sometimes, however, the pain is confined to its first situation, and is unattended by distension; but in other cases, it is more extended, and is accompanied with tympanitis. The stools become serous, fœtid, and frequent; the urine scanty; and excoriations of the nates, or the situations of blisters are disposed to gangrene.

22. *d.* In many cases, glandular enteritis is *consequent upon fevers*, or occurs during convalescence from them. This *sequela* has presented itself more frequently after some epidemics, and in certain localities, than in others. It has been well described by Dr. Cheyne, in his Reports, as it appeared in Dublin, in 1817. A patient in fever has become so much improved that a speedy convalescence is expected, but in a few days it is found that strength is not returning: the pulse continues quick, and the appetite, although sometimes restored, is oftener deficient or capricious. The patient expresses no desire to leave his bed, and he does not gain flesh. His tongue becomes dry, and he complains of a dull pain and uneasiness in his belly, with soreness on pressure, and a degree of fulness. To these succeed looseness of the bowels, with great weakness. Probably at the next visit, the patient is found lying on his back, with a pale sunk countenance, and a very quick pulse; and without mental energy. Mucous stools pass from him in bed, and the urine also. His breathing becomes frequent, and often hiccup occurs. Death is now nearly at hand; opiates, astringents, and cordials being alike unavailing.

23 *e.* In the more severe cases, and particularly when they assume either of the above forms, the abdominal or local symptoms occasionally become suddenly exasperated. The patient complains of violent pain in the abdomen, which is greatly distended, tense, and tender on the slightest pressure. He lies on his back, with his knees drawn up. His countenance is anxious and collapsed; his pulse is weak, small, remarkably accelerated, followed by extreme depression and sinking, by quick laboured breathing, cold extremities, and occasional hiccup. Death in these cases commonly takes place within 24 or 36 hours, from the accession of the severe pain and tympanitis; and is owing to ulcerative perforation of the intestines and consequent peritonitis rapidly extending over the greater part of the peritoneal surface.

24. *f.* In other instances, *intestinal hæmorrhage* occurs in the course of the disease, and sinks the patient more or less rapidly, according to its amount relatively to his powers, &c. In these cases, especially if the blood is poured out slowly in the small intestines, and in small quantity, it is more or less intimately mixed with the other matters passed by stool, and the evacuations are generally more frequent and abundant than in other circumstances. Intestinal hæmorrhage, particularly when the blood is more or less pure, is, however, much more frequent when ulceration has taken place in the large intestines.

25. *g.* Follicular or glandular enteritis may, particularly when occurring in a simple and sporadic form, assume a more or less *chronic* or *sub-acute state.* But in either of these states it will hardly be distinguished from the more chronic forms of muco-enteritis already noticed (§ 11.), unless by a more offensive mucous or muco-puriform state of the stools, and a weaker and more frequent pulse; but these cannot be relied upon. Very often, also, muco-enteritis and follicular enteritis are associated, especially in children. Enteritis consequent upon tubercular consumption is commonly seated chiefly in the follicles, and is chronic in its duration; but it is seldom limited to the small intestines; it generally extending also to the cœcum and colon.

26. *h.* The *progress* of the simple and sporadic states of follicular enteritis is generally slower, and the *duration* of it consequently longer, than the progress and duration of similar grades of muco-enteritis. It seldom proceeds to ulceration, or the ulcerative process rarely proceeds far in the situation of these glands, without giving rise to *inflammation and enlargement of the mesenteric glands corresponding to the diseased intestinal glands and follicles.* Indeed, it is not improbable that consecutive inflammation, enlargement, and obstruction of the mesenteric glands often arise before the follicles and glands become ulcerated, and yet are owing to the primary disease of these follicles and glands.

27. *i. In infants and children,* glandular enteritis is a very frequent disease, particularly amongst infants that are brought up by hand, or imperfectly nourished, or injudiciously fed, and that live in close, low, and damp cellars and localities, especially in large and manufacturing towns. It is frequent also at the time of weaning, and in humid, cold, and miasmatous situations. It often assumes a slight and chronic form, and then generally occasions mesenteric disease, which very frequently occurs consecutively upon either follicular or muco-enteritis, particularly the former. These two forms of enteritis are with great difficulty distinguished from each other in children or infants. Nevertheless, an opinion as to the presence of either may be formed from the descriptions furnished above (§ 12—19.) In the follicular variety, the stools are more generally mucous, and the diarrhœa is more marked than in the other variety. Indeed, *mucous diarrhœa* in children is very commonly caused by inflammation of the intestinal follicles and glands, or by a state of irritation which is very prone to pass into inflammation, which will assume either a slight and chronic, or a severe and an acute, form, according to the constitution of the patient, and numerous concurring circumstances. In the more acute cases, there is more or less fever, which generally assumes a remittent character; and it is sometimes attended by nausea or vomiting, and always by thirst.

The abdomen is tumid, uneasy, although not always painful or tender on pressure. Griping pains are often felt, especially before an evacuation; but there is no straining, unless the large bowels become implicated; and this often is the case as the disease proceeds; and it then assumes a truly dysenteric character, the stools often consisting of a reddish-brown mucus.

28. *k.* The more *slight* and *chronic states* of follicular enteritis in children are apt to be overlooked, or seldom come under the eye of the physician until it has passed on to organic change, generally to enlargement of the follicles or incipient ulceration, with consecutive disease of the mesenteric glands. The chronic state of the affection is often the consequence of its slightness or its gradual increase, which causes it to be neglected, or injudiciously treated, in respect both of regimen and of medicine. It is frequently also produced in connection with the more slight or chronic form of muco-enteritis; and it often proceeds from morbid states of the chyle and blood — or at least from causes which operate chiefly by deteriorating these fluids. The chronic affection is ascertained with difficulty in children and infants, especially during its early stages. It closely resembles not only the chronic form of muco-enteritis, but also *infantile remittent fever* and *mesenteric decline.* Indeed, the remittent fever may be altogether symptomatic of it; or it may be developed in the course of the fever. I have seen cases, both in public and in private practice, conclusive of this intimate connection — of these sequences of morbid action. The advanced state of the chronic disorder may not differ from mesenteric disease; for the former is rarely of long continuance without superinducing the latter. In many cases, the affection of the glands and follicles is slowly produced in consequence of general cachexia, or of a morbid condition of the circulating fluids; the constitution, especially the soft solids and surface, manifesting general disease, and the digestive organs more or less disturbance, the stools being mucous, offensive, or otherwise morbid. — In children, as well as in adults, it commonly supervenes, and proceeds to extensive ulceration, during the progress of tubercles of the lungs, and in the course of hectic or slow fever proceeding from the absorption of morbid matter or diseased secretions, or from local sources of irritation.

29. *l.* The *chronic form* of glandular enteritis may *terminate* in *perforation* of the intestines, and in partial or general *peritonitis,* mesenteric disease having been previously developed, and more or less advanced; but I believe that perforation is a less frequent consequence of the chronic, than of the more acute or sub-acute, states of the disease. When consequent upon the chronic form, it is chiefly when this form arises from tubercles in the lungs, or when it occurs in the scrofulous constitution. (See art. Digestive Canal, § 38. *et seq.*). — *Hæmorrhage* from the intestines is probably also less frequently caused by the chronic, than by the acute states of the follicular disease — at least according to my observations, although I have met with several instances of its occurrence in the chronic variety, consequent upon tubercles and ulceration of the lungs.

30. iii. Inflammation implicating all the Coats.—*The Enteritis Phlegmonodea* of Cullen; — *E. Iliaca* of Sauvages; — *Sero-enteritis* of modern writers. — *Inflammation extending to the cellular, and affecting all the tunics, especially the peritoneal.* — This variety of enteritis is *characterised* chiefly by the severity and continued duration of the pain of the abdomen, particularly around the navel; by frequent vomiting and great tenderness and tension of the belly; by the very accelerated, constricted, small, and even cord-like, pulse; by the marked tendency to constipation; and by the severity of the accompanying fever. As the inflammation extends to the peritoneum, or in proportion as this coat is affected from the commencement, these symptoms are prominent, but in various grades of severity, according as the disease is consequent upon muco-enteritis, or upon strangulation, or upon inflammation of some adjoining viscus, and according to the causes which have directly produced it. *Sero-enteritis* may thus be either *primary* or *consecutive; acute* or *sub-acute;* but very rarely *chronic,* unless in a particular form, in connection either with chronic ulceration of the intestines, or with chronic peritonitis.

31. *Description.* — *A. Acute sero-enteritis,* or *phlegmonous enteritis,* may occur *primarily,* particularly in warm or in tropical countries, and in warm seasons in temperate climates; but it more commonly is *consequent* upon some grade or other of muco-enteritis, although the symptoms of the latter may have been overlooked, or have not fallen under the observation of the physician. When it occurs primarily it is generally ushered in by chills or rigors: but when it is developed more gradually, owing to the extension of inflammatory action from the mucous to the cellular tissue, and thence to the peritoneal coat, then it is evinced by the appearance of the more acute and characteristic symptoms. — *a.* In the early stage of the disease, more especially if it be ushered in by rigors, there is great vascular and febrile excitement, which passes into exhaustion with a rapidity proportioned to the degree of the previous excitement and to the progress of the inflammation and of its consequences. Pain and tenderness of the abdomen are early felt, particularly under pressure, during which the patient winces, and evinces increase of pain or anguish by the expression of his face. The abdominal integuments become hard, irregular, tense, harsh, and hot, and the whole abdomen tense and distended, chiefly by flatus, which the patient feels to increase his sufferings. As the tenderness increases he is more constantly on his back with his legs drawn up, as if instinctively to relax the muscles and to keep off the pressure of the bed-clothes from the belly. If nausea, retching, or vomiting does not appear at the commencement of the attack, they are sure to occur as it proceeds, and to increase in severity with its progress. Constipation is obstinate in proportion as the more external tunics are affected; and the more obstinate it is, the more urgent is the vomiting, which often occurs either without being excited by the ingesta, or a considerable time after substances have been taken into the stomach. The urine is scanty and high-coloured. The skin is hotter than natural and always drier, excepting on the forehead and palms of the hands, where it is often moist. The pulse is very quick; generally from 100 to 120, or even quicker in the more intense cases, and at a

far advanced period. It is small, constricted, resisting, and firm; but as exhaustion comes on, it becomes small, thready, and weak. The respiration is quick and anxious, and chiefly effected by the diaphragm and intercostals, the abdominal muscles acting slightly or almost imperceptibly. The tongue is covered by a whitish fur, and there is excessive thirst.

32. *b.* As the vascular and febrile excitement passes into *exhaustion*, the abdomen becomes more distended and tense, and the pain and tenderness which had recently been most intense, subside more or less rapidly. The concentration of heat in the abdomen still continues; whilst the temperature of the extremities sinks. Respiration now becomes laboured; retching and vomiting more frequent, and the countenance more anxious and collapsed. As the stage or period of exhaustion is more fully evolved, the pulse is remarkably quick, generally ranging above 120, and weak, small, thready or undulating. The heat of the surface falls remarkably on the extremities, which are damp and clayey cold, and ultimately even on the trunk. The hands and feet often appear mottled with dark-red or livid spots. Respiration is irregular, embarrassed, or interrupted by catchings or hiccup. Vomitings occur without retchings or effort, the contents of the stomach being discharged by a retrograde action, or by a gulping-like motion. The tongue is dry, brown, and furred; the face is sunk, the orbits hollow, and muscular power altogether prostrate. This state continues but a short time, until the patient sinks, generally with a collected mind, and sometimes with hopes of recovery entertained until almost the last moment, or after all hopes have ceased to inspire the practitioner.

33. *B. Sub-acute sero-enteritis* differs from the acute chiefly in the severity of the symptoms and in their duration. The abdominal symptoms are less severe in this than in the acute form; and the attendant fever is also less. The *acute* variety is seldom protracted beyond the sixth or seventh day, very often not beyond the fourth; whereas the *sub-acute* may be prolonged, to twelve, fifteen, or even twenty days. The rapid progress even of the latter, and still more of the acute, should not be forgotten; nor their almost constant tendency to terminate fatally; as these circumstances most unequivocally prove the necessity for adopting a most active, decided, and a judicious treatment, at the commencement of the disease; for, when exhaustion begins to appear, every means will be inefficacious.

34. Although acute and sub-acute phlegmonous or sero-enteritis most frequently arises from the extension of inflammation from the mucous coat to the connecting cellular tissue, and thence to the external tunics of the intestines, yet these tissues may be almost coëtaneously affected, or the inflammation may commence in, or extend to, the serous coat, and thence to the rest. This latter is most likely to be the case when sero-enteritis appears consecutively upon external injuries, upon inflammations of adjoining parts, and upon strangulation, &c. — *Death*, in the unfavourable cases of acute and sub-acute sero-enteritis, is commonly caused by the extent to which inflammation and its consequences has proceeded in a vital organ, and by the shock imparted to the organic nervous power, by intense disease of a viscus most intimately connected with this vital part of the nervous system.

II. Inflammation of the large intestines.— Syn.— *Colitis, Colite,* Fr. *Eine entzündung des Kolons,* Germ.

Classif.—III. *Class.* I. Order (*Author*).

35. Defin.— *Pain and tenderness in the course of the colon, commonly originating in the region of the cæcum, and extending to the left iliac region and sacrum; with frequent, and often ineffectual, efforts at fæcal evacuation, generally preceded by tormina, and attended by tenesmus, the motions being mucous and streaked with blood; symptomatic inflammatory fever.*

36. The *cæcum* is sometimes primarily inflamed, without the disease advancing to a great extent either to the small intestines, on the one hand, or to the colon, on the other. This limitation of the inflammation to the cæcum is, however, comparatively rare, especially when its mucous surface is the part of it affected. *Inflammation of the cæcum,* particularly when thus confined, is fully treated of in the article Cæcum (§ 15.). When inflammation commences in this viscus, it generally extends to the colon, and even to the rectum; less frequently, it extends also to the ilium. When this latter intestine is inflamed, especially when its villous surface or its follicles are chiefly affected, the cæcum often participates in the disease, which frequently advances also to the colon and rectum. Such is the case in the several varieties of Dysentery, which, in most instances, either commences with, or soon passes into, inflammation of the mucous surface of the large intestines extending often to the ilium. In the purely inflammatory form of dysentery, the local morbid action is of the sthenic kind, and the accompanying fever also of this nature. In the low, adynamic, infectious, and epidemic forms, the local action is asthenic, and the attending fever of a low or typhoid character. In most of the forms of dysentery, there are portions of the large intestines somewhat more severely implicated than others, and these are the internal surface of the cæcum, of the sigmoid flexure of the colon, and of the rectum. The other portions of the colon and the ileum are likewise inflamed, but generally in a less degree, unless in very severe or protracted cases where they also present very remarkable lesions. In the different states of dysentery, also, the follicular glands as well as the mucous surface itself are affected, although probably in different degrees, particularly at the commencement of the complaint, at which period, however, dysentery is not always identical with inflammation of these parts, for dysentery, particularly in its asthenic, endemic, and epidemic appearances, usually commences with indications of morbid secretion and of inordinate action of the muscular coats of the intestines—with signs of irritation chiefly; inflammatory action either of a sthenic or asthenic kind being consecutive. However, in many of the more acutely and sthenically inflammatory cases, and especially in those which occur sporadically, and from causes which will hereafter be noticed, this disease is truly inflammation of the villous surface of the large intestines, seated, in some cases, chiefly in the colon and rectum; in others, in the cæcum and colon;

and, in many, in these three parts equally, and extending also to the ilium; but in all, the morbid action is not limited to the villous surface itself, nor to the follicular glands solely of these intestines, although it may commence in either, or be more prominent in one or the other.

37. *Inflammation of the Colon — Colitis* — which will be chiefly considered at this place, as *Inflammation of the* Cæcum, and *Inflammation of the* Rectum, are discussed in separate articles — generally *commences* in the villous or mucous surface, or in the follicles, and comparatively seldom in the cellular or connecting tissue of the coats of this bowel, or in the peritoneal coat. It may, however, originate in either of these latter, as in the case of *phlegmonous enteritis* (§ 30.), when it has been caused by wounds or external injuries, by strangulation, or has occurred consecutively upon inflammation of an adjoining viscus, or of the peritoneum, or of the omentum or mesentery.

38. *A. Symptoms of Acute Colitis.* — When the inflammation commences in the villous surface, as is usually the case, the bowels are at first loose or irregular, or mucous diarrhœa is present; feculent evacuations being first passed. In this state there may be neither chills nor rigors, or they may be slight. When, however, the coats of the bowel are more deeply and acutely affected, the disease is usually ushered in with rigors and chills. Pain and tenderness on firm pressure are generally felt in the course of the colon, extending from the cæcal region to the right hypochondrium, across the abdomen, midway between the pit of the stomach and navel, to the left side and left iliac region. The pain occurs in paroxysms, is often griping, and followed by an inclination to go to stool, the evacuations consisting chiefly of mucus with blood. If there be straining or tenesmus, with pain in the direction of the sacrum, the inflammation has extended to the rectum. If inflammation of the large bowels assumes a *subacute form*, it is attended by the same symptoms, and it observes the same course, as stated in the article Dysentery, at the place where the sthenic or inflammatory states of that disease are described (§ 11—16.). If it be very *acute*, it will differ but little, if indeed at all, from the variety of *dysentery* (§ 17. *et seq.*), observed so frequently in Europeans in warm and inter-tropical countries. Indeed, the chief differences between *colitis*, or inflammation of the colon, and inflammatory dysentery, arise from the extension of the morbid action, in the latter, to the rectum on the one hand, and to the cæcum, and even also to the ileum, in some cases, on the other. When, however, the rectum is unaffected, there will neither be straining, nor pain at the sacrum, the other symptoms attending acute inflammatory dysentery remaining; the inflammation of the rectum, in connection with colitis, occasioning some of the chief characteristics of inflammatory dysentery. (See article Rectum.)

39. When inflammation has invaded all the coats of the colon, either by extending from the internal surface to the peritoneal coat, or from the latter to the other tissues, or by attacking them all nearly coëtaneously — the second and third modes being, however, comparatively rare — then pain, increased heat, and tenderness in the course of this viscus, become more severe and constant, and extend over the abdomen; flatulent distension of it increases, particularly in parts; the stools are preceded by tormina — are frequent, scanty, mucous or slimy, very dark, streaked with florid blood — contain either scybala or broken-down fæces — are passed with much flatus — and are at last fœtid, with shreds of lymph or muco-puriform matter in them. The tongue varies in its appearance, but it usually becomes covered with a dark sordes, which forms into a crust as the disease proceeds. The mouth is dry: there is constant thirst, and occasionally vomiting. The urine is scanty and high-coloured, and the calls to pass it, frequent and painful. The pulse is quick, hard, and small, and ultimately small and weak. The heat, pain, tenderness, and flatulent distension of the abdomen go on increasing: and the disease, in most respects, excepting the dysenteric symptoms, assumes the features of the worst cases of *sero-enteritis* (§ 31.), or passes into a state of *partial* or *general* Peritonitis, or becomes identical with the far advanced stage of the most acutely inflammatory form of Dysentery (§ 17.); the local and constitutional symptoms, attending the unfavourable terminations of these, particularly of the last, also accompanying similar terminations of it. As colitis, however, appears more frequently associated with other diseases, than as a primary malady, especially with inflammations of other parts of the alimentary canal, or with those of the liver, omentum, peritoneum, &c.; and as it occurs in a variety of endemic and epidemic circumstances, and in various states of the constitution, so both the local and constitutional symptoms vary in different cases, and even in different stages of the same case. Still the pain, heat, distension, and tenderness in the course, or in some part, of the colon, in connection with the state of the stools and the severity of the local and constitutional disturbance, will sufficiently mark the presence of the disease.

40. *B. Chronic inflammation of the colon — chronic colitis* — is either consequent upon the acute or sub-acute states of colitis, or is itself a primary disease, the chronic condition proceeding from its slight grade and slow progress. As it usually occurs in practice it is identical with the *sub-acute or chronic forms of* Diarrhœa and Dysentery (§ 45. *et seq.*), the symptoms varying much according to its complications, and the circumstances of the locality in which it prevails, and of the individual affected, as above stated (§ 39.). Its most common complication, however, is with sub-acute or chronic disease of the liver, with abscess in this organ, and with disease of the mesenteric glands; but it may attend other diseases, particularly tubercles in the lungs. The symptomatic fever, in this state of colitis, is very frequently of a remittent or hectic type; and it often, particularly in warm and miasmatous climates, occurs in the course, or as a sequela, of intermittent and remittent fevers.

41. Chronic colitis generally occasions, and becomes associated with, chronic inflammation of the ileum, the disease affecting chiefly either the mucous surface, or the follicles of this intestine; but in this case, the cæcum also is more or less implicated. As this state of colitis proceeds, ulceration takes place; and the inflammation advances in parts, through the medium of the connecting cellular tissue, to the peritoneal coat,

coagulable lymph being thrown out on its surface, and giving rise to adhesions, &c. Similar changes, although to a less extent, also take place in the adjoining portions of the alimentary canal; and the disease *terminates* either in partial or in general peritonitis, or in thickening and constriction of the coats of the intestine, or as more fully described in the article DYSENTERY (§§ 48—58.).

III. INFLAMMATION OF BOTH SMALL AND LARGE INTESTINES. — *Ileo-Colitis* — *Entero-Colitis*, of various authors. *Ileo-Colite* — *Entero-Colite*, Fr. *Entzündung des Ileums u. des Colons*, Germ.

42. This is a frequent form of inflammation of the intestines — the morbid action affecting the ilium and colon solely, but in different grades in either, or extending also to the other portions of the small and large intestines, although in various degrees. It is probable, however, that the disease is not limited long to the ilium and colon, without the rectum being more or less affected; and we cannot reasonably exclude the cæcum from an equal share of the malady, when the ilium and colon are attacked. Indeed there is reason to believe that the *cæcum* is sometimes the part first affected, inflammation extending to the colon, on the one hand, and to the ilium, on the other, especially when the mucous surface is the tissue primarily attacked.

43. *A.* ACUTE ILEO-COLITIS. — *a. The symptoms* vary according to the portion of intestine chiefly affected; but the most *characteristic* of the more *acute states* are — pain, aching, or soreness, with frequent gripings, in the right iliac region, and between this part and the umbilicus, often extending across the hypogastrium, and occasionally above and around the navel; tenderness on firm pressure of these places; diarrhœa, the stools being thin, mucous, or watery; and symptomatic fever. At the commencement of the slighter cases, there may be neither chills nor rigors; or they may be slight, or they may recur and alternate with febrile heat; but they generally usher in the more acute attacks. As the disease is developed in its *acute form*, the patient complains of a sense of heat in the above situations, particularly in the region of the ileo-cæcal valve; and of flatulent distension, pressure frequently causing a gurgling sound in this region. The abdomen is hot, dry, and more and more painful, distended, and tender on pressure as the inflammation proceeds. The stools become more disordered, darker, more offensive, mucous, or watery, and occasionally streaked with blood, or contain imperfectly digested substances. The complaint, when judiciously treated, will generally not proceed further, all the symptoms gradually subsiding; but when it is neglected, and when it is complicated with disease of the liver or other organs, or associated with remittent or adynamic forms of fever, or when it extends to the rectum, thereby giving rise to a most severe and dangerous form of *dysentery* (§ 17.), the inflammatory action very often proceeds to disorganisation, the peritoneum ultimately becomes implicated, and the several lesions described in the article just referred to (§ 59. *et seq.*), and in that on the pathology of the DIGESTIVE CANAL (§ 34. *et seq.*), supervene and terminate life.

44. *b. Inflammation of both the small and large intestines* seldom extends in temperate climates to all the coats or tissues of all these viscera in the same case. When inflammatory action attacks or extends to all the coats or even to the peritoneal coat, portions only of either the small or large bowels are thus implicated, — more rarely of both. Yet I have frequently observed, particularly in warm climates, all the coats — the mucous and peritoneal inclusive — inflamed both in the ileum and in the colon, including the cæcum and even the rectum. In these cases, the disease commenced either as inflammatory diarrhœa, or as inflammatory dysentery, the morbid action existing in the mucous surface of the ileum and colon in the former and in the rectum also in the latter, — ultimately extending to all the tunics, in portions of these intestines, and giving rise to partial or general peritonitis and to the other consequences of enteritis already noticed, with the symptoms attending them, in their most severe and most prominently marked forms or in the form about to be described. When the inflammation proceeds thus far, the chances of recovery are very few; the change of structure already produced on the internal surface of the intestines combining with the intensity of the morbid action, and with its consequences, in the external coats, in destroying the patient. In these, the symptoms vary much in different cases, according to the part chiefly affected, and the other circumstances connected with the production and course of the disease; but either a combination of the local symptoms characterising both *sero-enteritis* (§ 30.), and *sero-colitis* (§ 39.), or a predominance of the symptoms of either, with great febrile commotion — with heat of surface, particularly of the abdomen, very quick, sharp, constricted, hard and small pulse; dry tongue, thirst, occasionally vomiting; scanty, high-coloured urine; and ultimately physical exhaustion, singultus, or flatulent eructations, cold extremities, &c. When the morbid action thus invades the external coats of the bowels, the diarrhœa subsides, and constipation often takes place, the seat of pain and of tenderness generally indicating the portion of the bowels chiefly affected.

45. *B.* ILEO-COLITIS OF WARM AND INTER-TROPICAL COUNTRIES. — *a.* Inflammation of the small and large intestines is of frequent occurrence *amongst Europeans residing in inter-tropical countries*, and indeed amongst the inhabitants of all hot climates. It generally commences in the villous coat, but it occasionally attacks all the intestinal tissues almost simultaneously, or the peritoneal coat chiefly, particularly when it is caused by exposure to cold in any way, or by sudden suppression of the perspiration. When it originates in the villous surface, it is often owing to, or at least connected with, a morbid condition of the biliary and other secretions poured into the intestinal canal; the alvine evacuations being more or less disordered. It rarely commences in the peritoneal coat, unless consecutively upon inflammation of the liver, with which it is often *complicated*, especially in India. At first, the bowels are seldom obstinately constipated, but they are sometimes costive. They are oftener, however, laxer than usual — and diarrhœa is present in many cases. Indeed, the disease often commences in the form of inflammatory diarrhœa, or of dysentery, and continues in either of these, particularly the former, as long as the villous coat

and follicles only are affected. The *stools* are morbid, of various colours, and frequently change their appearance. They are offensive, often dark-coloured, watery, or serous — sometimes pale, fluid, and frothy, resembling fermenting yeast; at other times, they are slimy-green, gelatinous, or mucous. As the disease advances, they are of a dark green, with lighter shades, or with brown or yellowish-brown streaks, and at last they become very dark and grumous, occasionally bloody, especially when the colon is much affected.

46. *b*. As the inflammation extends to the other coats, the griping pains, which manifestly, from the morbid appearances of the motions, arise from, or are increased by, the irritation of disordered secretions, are attended by more continued suffering, and by a sense of internal heat, or burning, with great soreness and tenderness of the abdomen upon pressure. The diarrhœa subsides, and the stools become scanty; and attempts at evacuation are accompanied with violent exacerbations of pain. The tongue is white, excited, red at its point and edges, and afterwards very loaded at its middle and base. The strength, especially of the lower limbs, is remarkably prostrated. The pulse is quick, soft, and small. Vomiting occasionally occurs, particularly after cold fluids taken to quench the urgent thirst. The abdomen is generally hot, tense, and tender. As the disease advances through the parietes of the bowels, the above symptoms increase. The stools, which were previously, and whilst the internal surface of the intestines were chiefly affected, of a watery, serous, mucous character, sometimes streaked with blood, now become more scanty and morbid; the abdomen more tumid, painful, and tender, and vomiting more frequent and distressing.

47. *c*. When the inflammation commences in what has been called the phlegmonoid form, seizing at once upon the different coats of the bowels, the symptoms are much more acute and violent from the first. The patient complains consecutively upon, or coëtaneously with, cold chills or rigors, of sharp pains around the umbilicus, in the right iliac region, or between these regions, and extending down to the hypogastrium. The pulse is hard, quick, and constricted, or small. The tongue is loaded, clammy, and dry. The bowels are irregular or constipated, and inefficiently acted upon by cathartics, until depletions have been freely practised. When the disease commences in this form, its progress is very rapid. The face soon becomes anxious; the stomach irritable, and the vomitings frequent; the tongue deeply coated, dry, and brown; the abdomen very tense, tumid, and tender; the skin, particularly over the trunk, very hot, harsh, and dry; the calls to stool most distressing, and unsatisfactory; the urine very scanty and high-coloured; and the respiration suppressed and chiefly intercostal. If the disease is not now arrested, all these symptoms increase in violence. The features are sharp and anxious; the patient lies on his back with his knees drawn up: the hands and feet are cold and clammy; whilst the abdomen is hot: the pulse is small and weak; the breathing laboured, hurried, and irregular, sometimes difficult or attended by hiccup. The pain and tenderness are often more diffused over the abdomen, extending to the hypochondria and hypogastrium — and the distension is augmented. At last, exhaustion, cold sweats, faintness, hurried respiration, singultus, with increased action of the *alæ nasi*, collapse of the features; a weak, small, thready pulse, extreme restlessness, and death, supervene.

48. *C*. Sub-Acute and Chronic Ileo-Colitis. — *a*. The *sub-acute* and *chronic states* of ileo-colitis, particularly in the slighter cases, differ in nothing from the *serous* and *mucous varieties* of Diarrhœa (§§ 9—12). — I have shown, in that article, that these varieties of diarrhœa, although generally commencing in irritation, usually depend, especially in *children*, upon inflammatory action, seated chiefly in the mucous surface and follicles of the ileum, cæcum, and colon; and that these, as well as some other forms of diarrhœa (§§ 13—18.), particularly when severe, of long duration, or attended by fever, pain, or tenderness, in the situations stated above (§ 43.), always present the usual consequences of inflammation of these parts, upon examinations after death. The *symptoms*, therefore, of sub-acute and chronic ileo-colitis are identical with those described as attendant upon the inflammatory states of Diarrhœa.

49. *b*. The more *chronic states* of ileo-colitis are most frequently *associated* with visceral disease of a chronic and sometimes obscure kind. They most commonly attend *tubercular consumption*, and in this case the mucous follicles and the solitary intestinal glands are chiefly affected, and contain, in the early stage, tubercular-like matter. Chronic disease of the liver and enlargement of the mesenteric glands are also frequent complications, the former generally preceding, the latter supervening upon, the intestinal affection. The acute and sub-acute forms of ileo-colitis are often associated with inflammation of the substance of the liver, and with certain endemic and epidemic fevers, of which, however, they are usually consecutive. Chronic ileo-colitis is seldom a simple disease; but, in its different complications, the affections which precede or occasion it, as well as those to which it gives rise, should be ascertained, before the intentions of cure be resolved upon. When the disease affects the rectum and sigmoid flexure of the colon, the desire to go to stool is almost constant, and the straining often urgent. In this case, the complaint becomes identified with *chronic* Dysentery.

50. *c*. *The symptoms* of chronic ileo-colitis differ but little from those of chronic diarrhœa. When the colon is but slightly affected, the stools may not be very frequent; but if it be the chief seat of the disease there will be more or less diarrhœa, the evacuations being yellowish, greenish, or clayey, or even muco-puriform in a more advanced stage, or when ulceration has taken place. Uneasiness and soreness are usually felt in the abdomen, and sometimes pain, at one place acute, at another dull, or fixed or moveable. These sensations are exasperated some time after a meal, also by moral emotions, by violent exercise, or by the motions of a carriage. The tongue is often not materially affected; it is sometimes pale. The appetite, particularly when the disease is symptomatic of tubercular consumption, is often not materially impaired. At an advanced stage, the abdomen is usually large and tympanitic, contrasting remarkably with the emaciated extremities, especially in *children*. In this class of patients, mesenteric disease supervenes on the

intestinal affection, and *marasmus* is produced. In some cases, however, especially in adults, the abdomen is either not swollen, or is even more than usually sunk. A short dry cough frequently attends the latter periods of the disease.—The *duration* of chronic ileo-colitis is indeterminate. It is often recurrent, intermittent, or remittent, presenting longer or shorter periods of remission, or of immunity from disorder, especially in its slighter states and earlier stages. But it generally recurs upon slight errors of diet or regimen, or after exposures to cold or humidity.

51. *D.* PSEUDO-MEMBRANOUS ENTERITIS—*Enterite pseudo-membraneuse*, CRUVEILHIER.—*a.* This form of enteritis was first described by Dr. POWELL. (*Med. Trans. of Col. of Physic.*, vol. vi. p. 106.) It has more recently been observed by CRUVEILHIER, ANDRAL, GENDRIN, GUIBERT, BRETONNEAU, and myself. It rarely appears in an *acute*, but generally in a *sub-acute* and *chronic* form—the latter especially; or, in other words, acute inflammation of the villous surface of the bowels is rarely attended by the formation of a false membrane on its surface to any extent, although portions of coagulated lymph of considerable size are occasionally passed along with the other matters evacuated in the advanced course of the disease. Pseudo-membranous enteritis is most frequently *chronic* and *intermittent*, or rather, it may be said to depend upon a latent and prolonged state of inflammation, extending along a very large portion, sometimes the greater part, of the intestinal canal, as evinced by the quantity thrown off; the most prominent symptoms subsiding for a considerable time and re-appearing afterwards, and continuing with more or less severity until the false membrane produced by it is detached and discharged. I have met with two cases of this disease in its most severe forms, and several instances in a much slighter degree. Both the former, and most of the latter, occurred in females, in which sex all the cases observed by Dr. POWELL also occurred.

52. *b.* The *symptoms* are often very slight, and consist chiefly of a sense of soreness, slight heat, and tenderness on firm pressure of the abdomen. The bowels are generally irregular—either too relaxed or too costive, and rarely natural, as respects either the times of evacuation or the state of the motions. After considerable intervals, sometimes of several weeks or even longer, colicky and violent abdominal pains are experienced, and the stools afterwards passed contain shreds of false membrane of various sizes, occasionally formed into complete tubes of considerable length. These formations are occasionally white and soft, and sometimes yellowish, consistent, and even elastic. From their appearances as well as from the symptoms preceding their discharge, there is reason to infer, that they may be produced in any part of the intestinal canal, or in both the small and large bowels at the same time. Whilst the symptoms are often so slight as hardly to occasion any inconvenience, they are sometimes much more severe in respect both of the intervals and of the painful attacks preceding the evacuation of these morbid productions. In these, the symptoms of *chronic muco-enteritis*, or of *chronic ilio-colitis*, are generally present. Heat, soreness, aching or dull or acute colicky pains are felt at intervals; but these pains are seldom increased by pressure, although soreness and aching are usually aggravated by it. After slighter or severer local symptoms of this kind being occasionally felt, for some weeks or even longer, and augmented by any error in diet, or departure from an abstemious regimen, a more violent attack occurs, and resembles either severe colic, or the symptoms attending the passage of biliary calculi into the duodenum. The bowels then generally become more lax, and the stools contain portions of false membrane, which continue to be voided for two, three, or four days, three or four evacuations often taking place daily. Occasionally the bowels do not act spontaneously, the discharge of these membranes being assisted by medicine. The severe symptoms afterwards subside, until the morbid formation is again developed, and begins to be detached. The pulse is sometimes not affected, but it is often somewhat accelerated. The tongue is usually covered by a whitish or yellowish-white mucus or coating, and is seldom red at its point or edges. The appetite is impaired; there is thirst, and much flatulence of the stomach and bowels; but the temperature of the surface, the state of the skin, and the urine, are not materially affected. During the severity of the paroxysm, vomiting frequently takes place: and Dr. POWELL observed jaundice precede it, probably owing to an inflamed state of the villous coat of the duodenum having prevented the discharge of bile into the intestines, or to the false membrane extending over, or into, the common duct.

53. Dr. POWELL states that in all the cases he observed, there was indigestion, with frequent recurrence of pain,—that the more violent seizures consisted in sudden and excessive pain, frequently increasing in paroxysms, and rather relieved by pressure, but leaving great soreness and tenderness during the intervals,—and that this state continued under four days, the stomach during it being very irritable, and the tongue clammy and coated. This physician justly considered the false membranes[*] thus discharged to have been formed in a similar manner to those observed in croup; and, in a few instances, in bronchitis. (This subject is further noticed in the article DIGESTIVE CANAL, §§ 46. 48.)

54. IV. ASSOCIATIONS OR COMPLICATIONS.—Several of these have already been noticed. The *follicular variety* of muco-enteritis is often associated with *adynamic* or *typhoid fevers*, or rather it occurs as a frequent complication of these fevers, especially in certain localities, epidemics, and circumstances, to which sufficient allusion has already been made (§ 17.). Its complication with *tubercular consumption*, also as a consequence of that malady, has like-

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[*] A lady, who came from Yorkshire to be under my care, and remained several months in London, was the subject of this complaint, associated with *Hysteria* in its most severe and complicated form, and occasionally amounting to catalepsy. She experienced a recurrence of the more painful seizures every four, five, or six weeks, followed or attended by the discharge of the false membranes, in large quantity, and sometimes in the form of perfect tubes. The catamenia were always most painful, somewhat irregular, attended by vomitings and severe abdominal pains, yet abundant; but they were also accompanied with the discharge of shreds or false membrane from the uterus. The discharge of the membranes from the bowels and vagina was not, however, contemporaneous, although sometimes nearly so. The nature and the severity, the rare complication, and the persistence of the disease, led to consultations, other physicians thus also witnessing this almost singular case.

wise been stated (§ 17.). With disease of the *mesenteric glands* it is likewise very often associated; but, in this complication, it is generally the primary affection. *Muco-enteritis* is very commonly connected with *disorder of the biliary functions* and with *disease of the liver*, particularly in India and warm climates. Either affection may be consequent on the other, but most frequently enteritis is the secondary disease. When matter is formed in the substance of the liver, *follicular enteritis*, with diarrhœa, or a chronic form of dysentery, is produced; but not so much by the acrid or otherwise disordered bile discharged into the intestines as by a morbid state of the blood, caused by the absorption of a portion of the matter from the liver. The blood thus contaminated induces disease of the intestinal follicles, and particularly of PEYER's glands. It is only when the surface of the liver is inflamed that the disease sometimes extends to the peritoneal surface of either the small or the large intestines, inducing *sero-enteritis*, or *sero-ileo-colitis*, the *omentum* and even the *mesentery* being sometimes also implicated. It is, however, not improbable that disease of the follicles, particularly if ulceration have taken place, will occasionally be followed by the passage of morbid secretions into the portal circulation, inflammation of the portal veins, and abscesses of the liver being thereby occasioned. *Jaundice* is also sometimes complicated with muco-enteritis, and may arise either from disease of the liver or ducts, or from extension of the inflammation to the common duct, or the occlusion of its opening into the duodenum, owing to turgescence of the surrounding tissue.

55. Inflammation of the internal surface of the small intestines sometimes extends from the duodenum to the *stomach*, and *gastritis* as respects the villous coat, being complicated with *muco-enteritis*. In some instances, the disease proceeds in an opposite direction, and in others, both the stomach and intestines are nearly coëtaneously affected; this latter occurrence being very frequent in fevers. Indeed, inflammation of the villous coat of both the stomach and intestines constitute one of the most common and important complications in *remittent*, *malignant*, and *exanthematous fevers*; but this part of my subject is fully discussed in the article GASTRO-ENTERIC DISEASE (§ 10. *et seq.*). The various forms of enteritis, but especially muco-enteritis, very frequently appear as complications in the course of *scarlatina*, *small-pox*, and *measles*, although often in slight or latent states, or more or less masked by the other phenomena of these maladies. In *scarlatina*, gastro-enteric inflammation is a part of the morbid conditions invariably present in some grade or other, or, in other words, inflammatory injection of the villous surface of the stomach and intestines is as constantly present as the same condition of the *vascular rete* of the skin, and most probably at a still earlier period of the disease, and to a much greater extent, when the eruption either is imperfectly developed on the surface, or disappears from it prematurely. This indeed is demonstrated by the symptoms in all cases, wherein they are carefully observed. The affection of the intestinal mucous surface, more especially in those cases just alluded to, is evinced by pain, tenderness, tension, and fulness of the abdomen, and by nausea, vomiting, or diarrhœa; the stools being serous, dark-coloured, and containing flakes of lymph of a much lighter colour. In the complication of scarlatina with enteritis, the villous coat itself is the part chiefly affected; whilst in that of *small-pox* with enteritis, the mucous follicles are often implicated. In the advanced stages, however, of these maladies, sero-enteritis occasionally supervenes, either alone, or in connection with peritonitis.

56. Enteritis may also occur as a complication of the advanced stages of *measles*, more especially upon the premature, or the regular decline of the eruption; but it is generally slight in degree, and rarely the cause of an unfavourable termination of that disease, unless when associated with general *bronchitis*, or with *pneumonia*. In some of such cases, the inflammation has been found affecting the villous surface of the intestines to a considerable extent, the mucous follicles and the mesenteric glands being enlarged or inflamed. There are other contingent complications of enteritis, as those with *splenitis*, with *peritonitis*, &c.; but they require no particular notice at this place, having been noticed under those heads.

57. In *children*, the different forms of enteritis appear more frequently associated with other diseases than in uncomplicated states; for they seldom continue long in those latter states without super-inducing other disorders. In many instances the complication is either accidental or contingent; in others, it depends upon the nature of the predisposing and exciting causes, whilst in some, the associated diseases arise as consequences of the primary affection of the intestinal canal. Sufficient allusion has already been made to these complications: the most important are, infantile remittent fevers, cerebral congestions, &c. bronchial affections, tubercles, disease of the mesenteric glands, &c. It is not unusual to observe, particularly in some seasons, a form of fever very prevalent, or even epidemic among children, in which both the *digestive* and the *respiratory mucous surfaces* are affected by a catarrhal form of inflammation, and in which the state of irritation seems to predominate in these surfaces above that of true inflammatory action. In many of these cases, it is difficult to determine whether the digestive canal, or the respiratory organs, are first affected; either may experience a priority, or predominance, of disorder; and the one may become free from disease as the other is more severely affected. These circumstances are of great importance in the management of this complication, which is extremely frequent in infants and children in London, particularly in the poorer classes and in children insufficiently or improperly nourished and clothed.

58. V. DIAGNOSIS. Little need be added on this subject; as much has already been stated in reference to it; and, as both in pathological and in therapeutical points of view, it is as necessary to point relations, approximations, or alliances, between diseases, as to assign distinctions between them, that exist only in the more extremely removed cases, and that cannot be detected in the majority of instances, or only partially, and in their slighter or finer shades. Writers, who had little knowledge of disease from close personal observation, have been in the habit of stating certain distinctions between allied affections of the digestive canal as if they were describing different genera, or distinct substances, in natural history, or certain

unvarying entities, or algebraic quantities; and hence misleading, more frequently than instructing, the inexperienced. The disorders which they have thus endeavoured to distinguish from the different varieties of enteritis, or rather from *enteritis* simply, as they have known but little of its various forms and associations — are *colic, ileus, gastritis, peritonitis, constipation, diarrhœa, cholera,* and *dysentery;* and it must be obvious to the scientific and rational practitioner, that it is quite as important for him to trace the connections between diseases, and the transitions of the one into the other, as to recognise differences, which are often more apparent than real, and which should be estimated as they truly exist — as modifications rather than differences — as indications of something in common, but as something also peculiar or proper to each, which it is necessary thus to establish.

59. *A.* There are certain circumstances connected with the *seats* of enteritis, to which some reference may be made, as being not without importance in practice; and these may be comprised in an answer to the following question: — *How far may the symptoms enable us to conclude as to what portion of the intestinal canal is chiefly or solely affected?* Before any conclusion should be arrived at, the exact seat of pain, the part in which it commenced, the seat of tenderness or distension; the state of the stomach and bowels, and the periods after taking food when vomiting or purging occur; the sounds and sensations caused by percussion; the appearance of the evacuations; and the nature of the exciting causes, should be duly considered. — *a.* The *seat* of pain at the commencement of the attack is always deserving of attention, as indicating, although not always correctly, the part affected. If the disease begin in the region of the *duodenum*, or if this part become consecutively affected, irritability of the stomach a very short time after food is taken, and either increased or interrupted discharge of the bile, are more likely to occur; and the calls to stool are not nearly so frequent as when the lower portions of the bowels are inflamed. (See DUODENUM, § 7. *et seq.*) When pain, tenderness, and fulness, commence around the navel, or between it and the right ilium, inflammation of the ilium may be suspected; and if there be diarrhœa, and pain in the region of the *cæcum*, the pains assuming a colicky or griping character, and extending in the course of the *colon*, the extension of the disease to these viscera may be inferred, especially if tenderness exist in these situations, if there be little or no vomiting, and if the symptoms be exasperated two or three hours after a meal. When inflammation of the villous surface of the colon is sub-acute or chronic, even although it implicate the lower part of the ilium, or when *chronic ilio-colitis* is present, the functions of the stomach are often but little affected, unless the attendant diarrhœa is suddenly arrested, or constipation occur. It is chiefly at the commencement, or during the early stages of inflammation, that it is limited to one portion of intestine, or to a single tissue. The rapidity of extension of the disease to adjoining parts is generally great in proportion to the depression of vital power, the state of this power in connection with that of the blood giving rise to the particular form or character of the inflammation, and of its consequences or products.

60. *b.* A *serous* state of the *stools*, particularly if albuminous flocculi, or pieces of lymph, be contained in them, show that the villous membrane is chiefly affected; whilst a *mucous*, or *muco-puriform* condition of them indicates disease of the follicular glands: a combination of these two states suggests the probable association of these affections. The presence of digested *fæcal matters* in the stools, duly coloured with bile, evinces the performance of the functions of the upper portions of the alimentary canal; but when the food is imperfectly changed, impairment of these functions, and great irritability of the muscular coat, owing to general and local debility, and disease of the mucous surface, may be inferred; the inflammatory irritation generally extending, in such cases, to both the small and large intestines. If the stools are devoid of their peculiar or usual *odour*, the large bowels are probably affected. If they contain small but numerous streaks of *blood*, or if the blood be mixed in small quantity with the other matters, a severe form of muco-enteritis is generally present. If the blood be passed in larger quantities, if it be mixed with the other evacuated matters, or if it be grumous, or muco-puriform matter be also observed, ulceration consequent upon follicular enteritis is usually found. If it be voided quite pure, in large quantity, and but little mixed with the rest of the motion, it commonly proceeds from the large bowels.

61. *c. Percussion* should seldom be omitted in endeavouring to ascertain the seat of enteritis. It can rarely be *endured* when, or in situations where, the inflammation has advanced to the serous coat. It assists in indicating the parts most distended by flatus, or obstructed by fæcal accumulations, by internal strangulation, or by adhesions, or thickening, &c. of the coats of the bowel. As long as the disease is confined to the inner surface, it seldom causes much pain at the time, although soreness or aching is usually increased by it afterwards.

62. *d.* Amongst other circumstances contributing to a correct diagnosis of the several forms and complications of enteritis, the nature of the causes, the constitution and the previous health of the patient, are not the least material; particularly as respects the character of the attendant fever, and of the local affection. If these causes are of a septic, contaminating, or depressing kind, such as already enumerated (§ 18.), the mucous follicles will be especially affected, and the fever will present the adynamic state. If the powers of life have been previously sunk, or if the circulating fluids have become morbid or contaminated, or if there have been manifest cachexia conjoined with great debility, the local and the constitutional affections will be such as just stated; and both the small and the large bowels will be similarly and almost coëtaneously affected. When inflammation in these cases advances to the serous surface, particularly after perforation of the coats, it extends rapidly over this surface, and gives rise to a more or less copious fluid effusion, the state of local as well as of constitutional action being, in such circumstances, rarely capable of producing coagulable lymph, as shown in the article INFLAMMATION (§ 58).

63. *B.* If it be necessary to ascertain the parts of the intestines which are the seats of inflammation, it is still more requisite *to determine whether or not*

inflammation is really present. This, however, is not always so easy as many have believed; for inflammatory action may exist in the digestive canal so as to give rise to many of its most dangerous results, without those symptoms, by which inflammation has generally been supposed to be indicated, having been observed. Several of these disorders, usually viewed as functional merely, and which undoubtedly are *such* in many, or even in the majority of cases, often proceed from inflammatory action in a portion of the villous surface, that either extends itself in a gradual or rapid manner, or becomes resolved when the causes have ceased to act, or when the secretions from the part have had the effect of removing the irritation or of unloading the congested and inflamed vessels. Many cases which have been viewed, from the character of the prominent symptoms, as flatulence, or constipation, or colic, or diarrhœa, have actually been some form or other of enteritis, or inflammatory states, in which certain portions of the intestines, or of the tissues composing their parietes, have been affected in a different manner, or in a modified form or degree.

64. *a. Flatulence, constipation,* and *colic,* are chiefly functional disorders of the digestive canal; but they often depend upon inflammatory irritation of some portion of it, and are apt insensibly to pass into inflammation. They, moreover, both severally and conjointly, accompany, as prominent and important symptoms, the most severe and dangerous forms of enteritis. Hence the necessity of determining their sources, and their connections with, or their independence of, inflammatory action. If the least tenderness or soreness on percussion, or on firm pressure of the abdomen, be felt or indicated, — if this examination soon afterwards occasion soreness, pain, or uneasiness internally, although neither may have been complained of at the time of making it,— if the pulse be hard, constricted, or full, or accelerated,— if the abdomen become tumid, or tense, dry, hot, or harsh,— if the tongue be white, the papillæ erect, and its point or edges red,— and more especially if nausea or vomiting occur — the connection of either of these affections with, or their dependence upon, incipient or developed inflammation, should be inferred, and a strictly antiphlogistic treatment prescribed. I have met with instances where enteritis had been treated as simple constipation with colicky pains, and where the slightness of the above symptoms, or the presence of only one or two of them, had deceived the inexperienced practitioner into the exhibition of acrid and heating purgatives, which had aggravated the disease, until it had proceeded too far to be arrested by the most judicious means, fatal symptoms suddenly appearing, and the patient sinking before the mischief was anticipated.

65. *b. Ileus,* like the preceding affections, may, or may not, be associated with, or be entirely owing to, inflammation. It is shown in the article on *Colic* and *Ileus* (§ 37—45.), that these affections are often thus related, the latter particularly; and that, even when depending upon the pathological states there enumerated, inflammation is very often either an associated or a superinduced lesion, generally implicating all the coats of a portion of intestine, or the serous coat more especially. In many of these cases, either some internal constriction, or strangulated hernia, or an intus-susception, is the cause of suffering; but in these, as well as in those originating differently, inflammation soon supervenes, although it is not always announced by rigors or consequent reaction, or even by the general character of the symptoms. Indeed the sufferings of the patient are frequently so great, and the vital power is so exhausted by the nature or extent of the lesion — the shock sustained by the constitution is such — as to prevent the developement of the phenomena of general vascular reaction, and to extinguish life, before the local chances characteristic of inflammation had proceeded far; or before symptomatic fever had supervened. These attacks, and particularly those varieties of colic usually denominated the *Lead,* and the *Madrid colic* (§§ 16. 25.), have been viewed as forms of *enteralgia* merely, or of *neuralgia* of the intestines, and described as such by several Continental writers. That the sensibility of the nerves of the intestines is morbidly excited or affected will be admitted; but that these diseases consist only of altered sensibility cannot be conceded. This is a part merely of the pathological states constituting these maladies; impaired and disordered secretion and excretion — a morbid condition of all the secretions poured into the intestinal canal, and diseased action of the muscular coats of the bowels, equally form a part, and often the most important and efficient part, of them, various other associated functional derangements being also present.

66. *c. Diarrhœa, Cholera,* and *Dysentery,* may be associated with intestinal inflammation, or may pass into it; and, equally with the foregoing disorders, require to be carefully distinguished in their simple and in their symptomatic or complicated states. — *α. Diarrhœa,* particularly its *serous* and *mucous* forms, has been already shown to be one of the earliest indications of enteritis, particularly when the mucous coat and follicles of the small and large intestines are the tissues affected. But the slighter and more evanescent states of diarrhœa are generally independent of inflammation, and proceed chiefly from irritation and increased exhalation and secretion, caused either by the nature of the ingesta, or by checked cutaneous and pulmonary transpiration, or by the state of the secretions poured into the digestive canal; the irritation and increased secretion, however, often passing into inflammatory action, whenever a predisposition to it is present. As soon as this change takes place, the states of the stools, of the abdomen, of the skin, of the pulse, and of the tongue, as described above (§ 7. *et seq.*), will generally indicate it to the careful observer.

67. *β.* The same observations apply to *Cholera,* which also may pass into enteritis; but it should be recollected that when muco-enteritis in an intense form is seated chiefly in the duodenum and jejunum, that the symptoms may nearly approach those of cholera; vomiting, diarrhœa, and sympathetic spasms of the muscles of the extremities, being often as severe in this state and seat of enteritis as in that disease. It has already been shown that bilious *cholera* (§25.) sometimes passes into enteritis; the irritation of morbid or acrid bile exciting inflammatory action in the mucous surface, that either subsides without proceeding further than this surface, or extends to the external coats when the inflammatory disposition is considerable. In either case, particularly in the latter, the physician will be guided by the

symptoms evinced by the parts and in the manner already named (§ 59.) in forming his diagnosis.

68. *γ*. In *Dysentery*, more or less of inflammatory action of the mucous surface and follicular glands of the large intestines is generally present, especially in the sthenic forms, and in the developed states of the disease. Still the inflammation is often a superinduced and an associated, rather than a primary, morbid condition in this malady, the abdominal secretions and excretions being the first disordered. These secretions irritate the mucous surface and its follicular apparatus, and induce inordinate or spasmodic action of the muscular coats of the bowel, and particularly of the rectum and sphincter ani, causing the retention of the more hardened portions of fæces, which further augments the irritation, until inflammation, with its various consequences, is produced. In such cases, it is not merely the existence and the exact seat of inflammation that should be ascertained, and which the description already given will generally indicate, but the characters of the local action and of the constitutional affection ought also to be closely observed and correctly estimated.

69. *d*. When inflammation extends to the serous coat of the intestines, it becomes identified with *peritonitis;* and whether it be limited to a small portion of this coat, or extend more or less generally, it is in all respects an intestinal peritonitis, of the diagnosis of which sufficient notice is taken under that head (see PERITONEUM), to which, and to the article STOMACH, where enteritis is distinguished from *gastritis*, the reader is referred for farther remarks on the diagnosis of these very intimately related maladies.

70. *e*. As the *complications* of enteritis are so important, it becomes requisite that the diagnosis of them, and even the successions of their appearance, should not be overlooked. This is still more important in warm climates, where enteritis is very often a complicated malady. When functional and organic *diseases of the liver* are attended by a morbid secretion of bile, or when this fluid has become acrid, enteritis is very commonly induced in one or other of its forms, and is then rarely limited to the small intestines, the colon and rectum being often implicated, and hepatic dysentery developed. But chronic enteritis, or ileo-colitis may *occasion*, as already shown (§ 49.), disease of the liver, particularly of its internal structure, either with or without purulent formations in it. In this case, increased frequency of vomiting, tenderness and fulness in the right hypochondrium and epigastrium, chills, rigors, and jaundice, may supervene, and indicate the nature of the complication, or they may be almost or entirely absent. In warm climates, enteritis, hepatitis, and dysentery, are often associated, and without sufficient proof being furnished of their course of succession. In the eastern hemisphere, however, the disease of the liver is most frequently the primary affection, although it sometimes is induced by either, or by both, of the other maladies. Of the complication with gastritis, it is unnecessary to add more, than that its existence should always be expected when enteritis is occasioned by stimulating, acrid, or poisonous ingesta, or by an excessive quantity of rich and heating food or drink. In these cases, the frequency of the vomiting, the recurrence of it instantly after substances are taken into the stomach, the constant or frequent eructations of flatus, the epigastric tenderness, soreness, pain and fulness, in addition to the symptoms of enteritis, will indicate the morbid association. When this complication arises from the nature or the quantity of the ingesta, the affection of the stomach sometimes subsides as that of the small or large bowels increases, and thus gastro-enteritis may pass into muco-enteritis, and thence into ilio-colitis or dysentery. This succession is not infrequent in warm climates, or in temperate climates in summer and autumn, and particularly in those who have partaken of unwholesome food, or who have exceeded in the use of spirituous or fermented liquors. Enteritis in connection with *gout*, or in the gouty diathesis, and especially upon the disappearance of gout from the extremities, is not uncommon, and is always sudden and severe in its occurrence; but further allusion will be made to it hereafter.

71. VI. TERMINATIONS OR CONSEQUENCES AND PROGNOSIS. — *A*. A *favourable termination* of enteritis is indicated by a diminished severity of the more prominent symptoms, by the decrease of fever, by a more natural state of the evacuations as to their appearance and their frequency, by a more copious discharge of urine, by a more clean, moist, and natural state of the tongue, by a less frequent pulse, and by a diminution of the tenderness, soreness, fulness, tension, and heat of the abdomen, the general surface becoming more moist and natural.

72. *B*. The *unfavourable consequences* or *terminations* of inflammation of the bowels are — 1st. Ulceration, with its consequences, intestinal hæmorrhage, or perforation of the intestines; — 2d. Various organic lesions of the coats of the intestines and of the mesenteric glands; — 3d. Peritonitis in some one or other of its forms; — 4th. Exhaustion of, or fatal shock to, the vital powers; and, 5th. Sphacelation of a portion of the intestinal tissues or parietes. — *a*. *Ulceration* of the intestines is not necessarily a fatal lesion, although it is so with few exceptions; for ulcers have been found cicatrized in this situation, the patient having died of some other disease which had occurred long subsequently to the intestinal affection. These *cicatrices* very rarely present any regeneration of the villous tissue, although this has been observed by M. ANDRAL. Their bottoms consist of a cellulo-serous tissue, of a greyish white, without either villi or follicular glands, gradually assuming the appearance of the surrounding mucous coat, and possessing considerable firmness and tenacity. *Ulceration* of the intestines — which is fully described in all its forms in the article DIGESTIVE CANAL (§§ 36—40.), — is not satisfactorily indicated by symptoms; although a combination of phenomena may lead to a just conclusion as to its presence. A muco-puriform or ochrey appearance of the stools, an increased frequency of them, the presence of large quantities of blood in them, and symptomatic fever assuming an adynamic, or chronic remittent, or hectic form, are the surest indications of ulceration. The diarrhœa appearing in the course of tubercular disease, is generally dependent upon, or connected with, disease of the follicular glands, and, at an advanced stage, with ulceration. Whenever muco-enteritis or follicular enteritis occurs in the course of a constitutional malady or

vice — of fever, of tubercles, or of general cachexia, the rapid supervention of ulceration may be anticipated.

73. *b. Various Organic lesions* of the parietes of the intestines, similar to those about to be noticed, or more fully described in the article DIGESTIVE CANAL (§ 25. *et seq.*), and of the mesenteric glands, may be occasioned by enteritis, the patient continuing for months or years subsequently to evince disorder of the sensibility or functions of the bowels. These lesions, particularly dilatations, contractions, thickening of the coats, &c., according as they influence the calibre, or the secretions, or the contractility, or the organic sensibility of the intestines, occasion flatulence, constipation, colic, indigestion, retchings, emaciation, fæcal accumulations, hypochondriasis, and various nervous complaints, and, at last, either an attack of inflammation of the bowels, or of one of the associated viscera, or some other malady, carries off the patient.

74. *c. Peritonitis*, whether circumscribed or general, takes place in *two ways* — from ulceration, and from the extension of the inflammation to the serous coat without ulceration. It may arise from ulceration without perforation of this coat. In this case, the peritonitis is usually limited. If the ulcer have perforated all the coats, general peritonitis, caused by the effusion of a portion of the contents of the intestines, commonly results. Sometimes, however, perforation takes place without effusion occurring, owing to adhesions of the opposing serous surfaces having taken place before the coats of the intestine had been entirely penetrated. This consequence of enteritis is fully illustrated in the articles on the PERITONEUM and DIGESTIVE CANAL (§§ 40—43.), where numerous instances and references are adduced. The extension of the inflammation from the internal to the external surface of the bowel, whether it continue limited to a portion only of the latter, or extend more generally, is a frequent consequence of enteritis, which is indicated by the symptoms already enumerated (§ 31.), and by those more fully described when treating of inflammation of the PERITONEUM.

75. *d. Exhaustion of*, or *the shock sustained by, the vital powers*, is more frequently a termination or consequence of enteritis, than sphacelation or gangrene. Many of the instances of death which have been attributed to this latter change have actually depended upon the former; but, when sphacelation of a portion of the intestine does take place, very nearly the same symptoms which indicate the one accompany the other. It is extremely probable, moreover, that in some of those cases where gangrene of a portion of intestine is detected after death, the gangrene had not existed at the moment of death, or had commenced either then, or soon afterwards; and that the symptoms were those of vital exhaustion or shock, leading not only to death, but also to sphacelation of the most inflamed part, death occurring first, and sphacelation soon afterwards, or both nearly contemporaneously; an opposite course, however, taking place in rarer cases. When the pulse becomes very rapid, small, weak, irregular or intermittent; when the breathing is hurried, laboured, irregular, and attended by increased action of the nostrils; when hiccup or regurgitation of the contents of the stomach without retchings occurs; when the patient complains of sinking, coldness of the general surface or of the extremities, or becomes restless; when the abdomen is tympanitic without increase of pain, or the skin is cold and clammy; and when the eyes are sunk, surrounded by a dark circle, and all the features sharp and collapsed, vital exhaustion, in connection with more or less of structural lesion, has then proceeded too far to admit of hopes of recovery.

76. *e.* Although *gangrene* oftener follows immediately upon, than precedes, dissolution, yet we sometimes have its existence antecedently to this issue sufficiently demonstrated. When the inflammation is caused by strangulation, and an operation is performed at a too late period, the portion of intestines thus circumstanced has been occasionally found in a sphacelated state, although more frequently it is a state of venous congestion, or a condition about to pass into sphacelation, rather than this latter state, that is observed. Moreover, in cases of enteritis caused by intus-susception, a considerable portion of intestine has been thrown off in a gangrenous state. Even portions of the villous coat of the bowel has been detached by effusion of fluids underneath it, whereby, its vascular connection being destroyed, sphacelation has taken place. In all such cases, the symptoms of vital exhaustion above enumerated (§ 75.) present themselves, and death ensues, with very few exceptions. These exceptions occur only when adhesions of the opposing surfaces had formed so as to admit of the detachment of the sphacelated portion, without effusion of the intestinal contents into the peritoneal cavity taking place. When gangrene precedes dissolution, then, in addition to the symptoms just noticed, extreme tympanitic distension of the abdomen, with diminution of the pain, or complete cessation of pain; faintness, breathlessness, syncope on raising the head, sinkings, cold-sweats, and coldness of the surface; constant hiccup, with flatulent eructations; unconscious or unrestrained evacuations, with a putrid or cadaverous odour; a small, weak, imperceptible or intermitting pulse; collapsed features, sunk eyes, and discoloured surface, indicate the disorganization, and soon terminate in death.

77. VII. APPEARANCES AFTER DEATH. — I must refer the reader to the articles on the DIGESTIVE CANAL (§§ 18—43.), DIARRHŒA (§§ 13—23.), and DYSENTERY (§§ 58—60.), for a detailed account of the structural changes consequent upon inflammations of the intestines, and merely state, at this place, those more generally observed. — When enteritis or entero-colitis supervenes upon inflammation of the stomach or liver — the disease of these organs occasioning death, and thus furnishing an occasion of observing the earlier changes connected with enteritis — the villous coat is then more vascular and florid than usual, and more turgescent, particularly the valvulæ conniventes; and in many places the mucous glands are more developed, and marked by a deeper tinge. The appearances are not uniform throughout the canal; but are most remarkable in the duodenum and upper portions of the ilium, when enteritis has been caused by a morbid state of the bile, or has been consequent upon gastritis. In these slight or incipient states, the inflammation is present only in broad patches or streaks, leaving the intermediate spaces of a nearly healthy state. The lowest portion of the ileum, the ileo-cæcal valve, and cæcum, are

oftenest found diseased, particularly in acute cases, and where enteritis or entero-colitis occurs as a complication of febrile diseases.

78. *a.* In the *acute forms* of enteritis, the villous coat is not only more vascular and turgid, but it is also softer, and sometimes thicker than natural. If the inflammation has proceeded far, it presents a brick-red tinge, and is easily detached from the subjacent coats, the connecting cellular tissue being soft, turgid, and inflamed. When this state exists in a considerable portion of the tube, the coats are apparently thickened, arising from the extension of the inflammation to the more external tissues, till the attached surface of the intestinal peritoneum is reached. The substance or parietes of the bowels may be considered as affected, in these cases, even although the external surface may present no further lesion than red vessels shooting into it. Occasionally, in addition to this state, the red capillaries in the inflamed peritoneal coat are connected with the effusion of coagulable lymph, particularly in those parts where they are most numerous, the lymph or albuminous exudation existing in specks, or in considerable spots or patches, on the serous surface. When, however, these latter appearances are remarked, the interior of the inflamed intestine frequently presents more serious changes than yet noticed. The villous surface is then deeply inflamed, and seems abraded or excoriated in parts. It is sometimes, in other parts, covered by patches of lymph, or of an albumino-puriform or muco-puriform fluid, or by a sero-sanious matter; and it is often also ecchymosed in numerous points or specks, or it presents still larger marks of sanguineous infiltration. In other cases, portions of a dark, slate-coloured, or sphacelated hue are observed, with or without ulcerated specks, or even large ulcers, which have nearly penetrated as far as the external coat, in adjoining parts. In rarer instances, one or more of these ulcers have made their way through the peritoneum, the contents of the bowel being partly discharged into the peritoneal cavity. Occasionally the ulcer has become attached at its margin to an opposite convolution of the intestines, the escape of fœcal matters into this cavity being thereby prevented. In a few cases, where the peritoneal surface has been coated with coagulable lymph, in the progress of the ulcerations through the membrane, the ulcers have been covered over by the lymph, so as to prevent the passage of the intestinal contents through the perforations. In addition to disease of the follicles, and to the consequences of such disease, particularly ulceration and perforation of the intestinal parietes (see DIGESTIVE CANAL, §§ 37. 40. *et seq.*), the villous surface, especially after the forms of enteritis observed in warm climates, is often excoriated or abraded in parts; and it is not infrequently sphacelated in large patches, particularly in the large bowels. These changes, however, as well as those consequent upon chronic enteritis, especially as respects the follicles and glands, are more fully described in the articles DIARRHŒA (§§ 12—22.), DIGESTIVE CANAL (§ 36.), DYSENTERY (§ 58.), and FEVER (§ 519.). I shall not therefore allude to them further at this place.

79. In the forms of enteritis in which the substance of the intestine, or its peritoneal coat, is chiefly affected, either primarily or consecutively, the whole of the coats are often very vascular, red or of a brick-red colour, and are readily torn. Coagulable lymph is effused on the serous surface, either in distinct clots, or as a general film, of greater or less thickness, and gluing the convolutions to each other, and to the adjoining viscera and surfaces. In these cases, the omentum has sometimes participated in the disease, being either more than usually vascular, or drawn up irregularly to the arch and flexures of the colon. When the examination is made within a few hours from death, as is usual in warm climates, the vascularity of the diseased parts is very great; and although the colour may be beginning to change, or the parts to assume a gangrenous appearance, yet complete gangrene of all the coats of the bowel is not often met with. It is, however, common to find the villous surface apparently sphacelated in places, and the external coat of the same part either of a bluish or brownish hue, but not altogether deprived of its cohesion, although more easily lacerated than usual. In these acute cases, the inflamed intestine is generally distended with flatus; but it is sometimes constricted, and the constricted portions are occasionally so small as to give the appearance of stricture by the application of a fine ligature. Intro-susceptions of portions of the ileum, which had taken place subsequently to the occurrence of inflammation, or even just before, or at the period of death, are met with in rare instances.

80. *b.* In *chronic cases*, as well as in the acute, the changes are chiefly observed either in the villous surface or in the follicles, or in both. Many of the lesions observed after the acute forms of the disease are also met with after the chronic states. In the latter, however, the villi are frequently of a blackish tint; and the isolated follicles and glands are oftener affected than the agminated glands, which latter are chiefly attacked in the acute. As respects the villous coat, the lesions consist of softening, thickening, and induration; with various changes of colour, from the lighter hues to a slate or deep-brown colour, and even to black. Whilst softening of the internal coats are most common in the acute, hardening of these parts is most frequent in the chronic, states of the disease. With the thickening of the villous and connecting cellular tissues there is sometimes a very remarkable contraction of the bowel; and many of the alterations described in the article DIGESTIVE CANAL (§§ 26—31. 52. *et seq.*). As respects the changes of the follicles and glands, I can add but little to what I have stated in this and the other places already referred to.

81. *c.* The *ulcerations* which take place in this form of the disease assume three different forms:— 1st, Those which commence in the agminated or PEYER's glands, and are seated longitudinally in the intestine: 2d, Those which originate in the isolated follicles and glands, and are of a rounded form: and 3d, Those which attack the villous surface, and present a transverse direction as respects the canal of the bowel. Either of these may go on to perforation and the production of acute or chronic peritonitis. Occasionally tubercular matter is detected at the margins of the ulcers. The mesenteric glands are often enlarged, inflamed, or congested, softened, and even suppurated.

82. *d.* I have had no opportunity of observing the appearances after death in the chronic cases where membranous or tubular exudations have been voided from the intestines, but such appearances

have been observed by several authors. Dr. MONRO states, that when the villous coat of the intestines is inflamed, the diameter of the part is much diminished by the effusion of coagulable lymph upon this coat; that the quantity of lymph is very various, sometimes being as thin as a wafer, at other times nearly filling the affected bowel; and that occasionally it forms only a thin lining to the villous coat, or appears in the form of tattered shreds, — in some cases filling the spaces between the valvulæ conniventes, in others covering these. In a case described by M. PAILLOUX, the villous coat was covered by a membranous layer extending uniformly over its surface. The follicles did not seem to have any share in the production of this membrane, which he considered as differing only by its continuity and thickness from the small isolated patches secreted by the villi in aphthous affections. According to the appearances observed by MM. BILLARD and LALUT, these tubular exudations and false membranes are produced from the villous surface itself, and not from the mucus secreted by the follicles, or from a diseased action of these follicles. These exudations have been observed in all parts of the alimentary canal.

83. *e.* In the *acute and chronic forms* of enteritis, inflammation of portions of the mesentery is sometimes observed, either with or without disease of the glands; and an œdematous state of this part is occasionally met with. Other changes are more rarely remarked both in the small and in the larger intestines; but they are merely incidental, and are described in the places above referred to. Various alterations are often also observed in the related viscera; but these are accidental complications which need not be adduced at this place.

84. VIII. CAUSES OF INFLAMMATIONS OF THE INTESTINES. — i. *Predisposing.* — The several varieties of enteritis occur at all ages, in all temperaments, and in both sexes; but they are most frequent in infants during the first dentition, and soon after weaning; and in the nervous, irritable, and sanguine temperaments. They are occasionally more prevalent in some families than in others, owing to peculiarity of constitution, and have hence assumed, in a few instances, somewhat of an hereditary character, especially in their slighter forms. Both sexes are nearly equally liable to them; males being, however, rather more frequently attacked than females, probably in consequence of their greater exposure to the exciting causes. The several forms of the disease may assume, from states of season and weather, or from the constitution of the air, a more or less *epidemic* prevalence. They are most common in warm and humid seasons, and when the vicissitudes of temperature are sudden and great: hence they are more frequent in autumn and summer than in other seasons, and when cold nights succeed to warm or hot days. They are also almost *endemic* in some countries, partly owing to the high range and high daily vicissitudes of the temperature, in connection with great humidity of the atmosphere; but partly, also, owing to the low and miasmatous state of the locality, or to the circumstances connected with the supply of water. Inflammations of the bowels of an asthenic form, often assuming the characters of dysentery, or chronic diarrhœa, or chronic ileo-colitis, or a true follicular enteritis, are very commonly caused, in hot climates, and even in numerous places without the tropics, by water preserved in tanks, or taken from marshes, or abounding with animal exuviæ or animalcules.

85. ii. *The exciting causes* of enteritis may be divided into — 1st, Those which operate directly on the digestive villous surface: 2d, Those which act indirectly, by arresting the secretions and excretions, and by determining the momentum of the circulation to the intestinal mucous membrane: 3d, Those which act mechanically, as strangulations, injuries, wounds, &c.: and, 4th, Those which act sympathetically. — *A.* The *causes acting directly upon the bowels* are the *ingesta*, whether alimentary, medicinal, or poisonous. — *a.* The *food* often occasions enteritis, gastro-enteritis, or entero-colitis, by its quality, quantity, variety, and incongruity. Heating, stimulating, or rich food, especially in great quantity, frequently produces muco-enteritis, and its several consequences and complications; whilst food which is unwholesome, septic, putrid, imperfectly preserved, or mouldy, or spoilt, or innutritious, generally occasions follicular enteritis, or entero-colitis, or dysentery. Too great a quantity of food, or incongruous or indigestible food, particularly after prolonged abstinence or fasting, is a frequent cause of the more acute forms of enteritis. Thus a quantity of cheese eaten in these circumstances has, in several instances which I have observed in the course of my practice, produced this effect. Amongst the alimentary substances most productive of enteritis, smoked, dried, and long-preserved meats, pork, ham, bacon, cheese, stale fish, and high-seasoned dishes, may be particularized.

86. *b.* The inordinate use of *spirituous* or other *intoxicating liquors*, is amongst the most common causes in the lower classes, particularly in hot climates and in warm seasons. Even a small quantity of spirits taken by persons unaccustomed to them, and during disorders of irritation affecting the alimentary canal, will often develop a state of inflammatory action. Unripe or stale fruit; too large a quantity of fruit or of vegetables; most acid and cold fruits, and particularly pine-apples, melons, and cucumbers; cold fluids or ices taken while the body is perspiring, or very soon after, or immediately upon, a meal; and acidulated beverages, or cyder, perry, &c., often occasion either enteritis, or some one of the disorders of the digestive organs most apt to pass into, or to be associated with this disease. The changes which the ingesta undergo in the stomach and bowels, especially when excessive in quantity or variety, or otherwise incongruous, and when imperfectly changed by the gastric juice and bile, give rise to enteritis either directly, or consecutively to indigestion, costiveness, colic or diarrhœa. The influence of the secretions, particularly of the bile, when redundant or acrid from the changes consequent upon interrupted excretion of it, in giving rise to ileo-colitis, has already been insisted upon.

87. *c.* The frequency of the several forms of enteritis in young children, particularly infants brought up by hand or after weaning, is caused chiefly by the inappropriate or too abundant supply of food, in these circumstances. The digestive organs cannot dispose of the food, either from its quality or quantity, and the undigested part irritates the digestive villous surface, or undergoes changes producing the same effect. In some instances

the disease, especially the follicular variety of it, is caused by the insufficient quantity of aliment obtained from the food, owing to its unsuitableness to this early period of life, this cause combining with the irritation produced by the undigested portion. The milk, also, of some nurses, owing to the state of their health, and of their digestive organs, or to their habits, especially in resorting to spirituous liquors, occasionally gives rise to enteritis, or gastro-enteritis, in the infants suckled by them.

88. The influence of an innutritious and fluid diet in causing muco-enteritis and follicular enteritis, the latter especially, particularly when aided by cold and humidity, or by miasmata, or by foul or unwholesome water, has been too much overlooked. A starving diet and regimen not infrequently develop these forms of the disease in an asthenic form, or in the guise of chronic diarrhœa or chronic dysentery, particularly in persons previously accustomed to live fully or intemperately; and if these disorders prevail in a number of persons, either crowded together or shut up in ill-ventilated apartments, adynamic or typhoid fevers will be generated, complicated with the enteric disease. The influence of stagnant and foul water, more especially water long shut up in wooden casks, and river or canal water containing animal matter or impurities conveyed by the sewers running from cities or large towns, in producing follicular enteritis, is much greater than is generally supposed. The use of impure water favours the production of the disease when other causes are in operation, and imparts a specific, generally an asthenic, character to the malady. It has the effect of a slow poison, and acts on the economy not merely by impairing the tone of the organic nerves, and villous surface of the bowels, but also by contaminating the circulating fluids, and thereby producing not only a local, but a constitutional, disease at the same time. In this disease, the general and local asthenia is more prominent than inflammatory action, which is limited to the intestinal glands and follicles, and is often characterized by a tendency to ulceration or disorganization, rather than to reparation.

89. *d. Medicinal substances*, particularly acrid purgatives, stimulants and tonics, injudiciously resorted to, are more frequently the causes of enteritis than is commonly supposed; the effects of these medicines being often mistaken for the natural course of the disease. Acrid purgatives, given with the view of removing indigestion, colic, or constipation, and injudiciously repeated, in circumstances requiring milder means, have often converted these complaints into acute enteritis, or have aggravated inflammation where it already existed. Stimulants and tonics, prescribed with the view of removing debility, and the various forms of indigestion, have likewise developed a latent inflammation, or changed slight inflammatory action, giving rise to symptoms mistaken for those of debility merely, to acute enteritis, or to gastro-enteritis. I am, moreover, convinced, from personal observation, during an early part of my experience, when I had opportunities, in different climates, of observing, without interfering with the practice of medical officers in charge of hospitals, and, from the perusal of the journals kept by others, that numerous cases of diarrhœa, and still more of dysentery, have been aggravated into the most acute forms of enteritis, or of entero-colitis, by the repeated, continued, and extravagant exhibition of acrid, or heating cathartics. I have in my possession hundreds of cases of these diseases, written by the medical men who treated them, in all of which the usual phenomena of inflammation, when seated in the villous surface of the intestines, and attended by morbid action of the muscular coats, were viewed as the consequences of the accumulation and retention of morbid secretions and fæcal matters, and treated by large doses of cathartics prescribed not daily only, but at intervals of a few hours, and thus persisted in until the dissolution which they either caused or accelerated took place. The fire once kindled, however slightly or weakly burning, was thus fanned to a blaze, which soon extinguished itself in fatal disorganisation. A slight diarrhœa, or simple dysentery, arising from irritation or determination to the intestinal villous surface, has been converted, by a continued use of the most drastic purges, into inflammation, which, in its turn, has been urged on, by the same agents, to fatal sero-enteritis and peritonitis, with sphacelation of the villous coat.

90. *e. Poisonous substances* are amongst the most common causes of enteritis, but generally complicated with gastritis — of gastro-enteritis. Some poisons, however, pass into the bowels from the stomach, without affecting the latter in a very sensible manner. Most of the mineral poisons, and of the acrid and acro-narcotic poisons, inflame the mucous surface of the intestines; and when they fail of producing fatal results by the intensity and the extent of inflammation, by their injurious impression on the organic nervous influence, and by the change they produce in the blood, — by these effects, individually and conjointly — they are generally the cause of a severe and often prolonged form of enteritis, which, however, differs materially, in its precise seat, and in its characters, according to the particular agent which excited it. (*See* article Poisons.)

91. *B. Those causes which act indirectly*, and chiefly by suppressing accustomed secretions or excretions, and by determining the momentum of the circulation upon the abdominal viscera, are exposures to sudden vicissitudes of temperature, especially in connection with humidity and the influence of malaria; sleeping in damp beds or clothes, or in exposed places, or on the ground during campaigns; the abstraction of the animal heat from the feet, the loins, and abdomen; unusual heat applied to the back and loins; and the drying up, the suppression, or the disappearance, of accustomed discharges, evacuations, or eruptions. Enteritis is often caused by the suppression of an accustomed perspiration of the feet. Sleeping on the ground, or exposed to the night dews, especially after a debauch or the excessive use of spirituous liquors, is a very frequent cause of this disease, and particularly of phlegmonoid or sero-enteritis and colitis, amongst soldiers and sailors, especially in warm or inter-tropical regions. I have seen instances of the disease occasioned by sitting with the back to a warm fire at dinner; by the suppression of the catamenia, and by arresting, or preventing the returns of, the hæmorrhoidal flux, without instituting such precautionary measures as the circumstances of the case required.

The repulsion of *gout* or of *rheumatism* from the extremities has, in rarer instances, a similar effect, and enteritis appearing in these circumstances presents certain peculiarities, especially in the gouty diathesis, or when it occurs from the retrocession of gout from the feet. It is then always very acute, is attended by intense pain, and is characterised as much by the extreme morbid sensibility of the parts affected as by the severity of the inflammatory action, the former pathological condition requiring more attention from the physician than even the latter.

92. *C.* Many of the causes of enteritis are altogether *mechanical*, and act either *internally* or *externally* in respect of the canal of the intestine. — *a.* The former consist chiefly of hardened fæces obstructing the tube, or lodged in the cells of the colon; concretions of various kinds; and the inordinate distension occasioned by gases or fæcal accumulations. Hardened fæces and concretions first irritate, and afterwards inflame the parts in contact with them, if the muscular action of the coats of the bowel fails in procuring their expulsion, and a somewhat similar effect is produced by retained or accumulated fæces and morbid secretions. The over-distension occasioned by flatus weakens the coats of the intestine, overcomes their power of re-action, and favours the suppression of the natural exhalations and secretions, and the consequent developement of inflammation, in the over-distended part.

93. *b.* The mechanical causes of enteritis *external* to the canal are hernial strangulations, and strictures of any kind which diminish the diameter of the canal; intus-susceptions, the pressure of tumours developed within the walls of the abdomen and pelvis, and injuries, wounds, or operations. — Every patient who complains of the usual symptoms of enteritis, especially of vomiting and constipation of the bowels, should undergo a strict examination, in order to ascertain the existence or non-existence of the several kinds of hernia. The presence of hernia in connection with enteritis indicates at once both the nature and the cure of the disease: but hernia or external strangulation may exist without the lesion being manifest, or its seat or cause being detected, or even admitting of detection, although suspected and carefully inquired after; and the mischief may be caused by an old hernia, or in connection with an old protrusion, which can no longer be detected on examination. When internal strangulation exists, the symptoms of ileus, or of acute enteritis, or of both in succession, are usually present. The seats and causes of strangulation are so numerous, as shown and described in the articles on COLIC and ILEUS (§ 37.), and DIGESTIVE CANAL (§§ 56, 57.), that we can but seldom come to a correct conclusion respecting them, unless they are subjected to our senses, as in the case of external hernia: yet we may occasionally, from a review of antecedent and concomitant circumstances, draw inferences, not only as to the existence of internal constriction or strangulation, but also as to its source, that will approximate, although they may not be altogether, the truth. Either of the many causes which I have enumerated, in the article just referred to, as productive of *ileus*, may also occasion enteritis, the inflammation generally commencing at the point of stricture or strangulation, and in the peritoneal coat, and extending thence usually to the distended portion of intestine above this point, and to the rest of the tunics.

94. *c. Intus-susceptions* produce, as shown at another place (COLIC and ILEUS, § 38. *et seq.*), either *ileus* or *enteritis*, or both, either coëtaneously or consecutively. Where enteritis takes place, it usually proceeds from strangulation of the intro-suscepted portion of intestine, and assumes a most acute form, the inflammation generally commencing in the serous coat, implicating the rest of the coats, and sometimes terminating in gangrene and even in the discharge of the gangrened portion of intestine, the canal being preserved by the union of the edges of the divided intestine. But this subject is fully described in the place just referred to, and also in the article DIGESTIVE CANAL (§§ 54, 55.).

95. *d. Tumours* formed in any part within the abdomen, may, from the injurious pressure, or from the irritation occasioned by them, or from the extension of inflammation from their surface to the serous coat of the intestines, give rise to enteritis. Tumours in the omentum, in the ovaria, or connected with the uterus, sometimes cause inflammation in either of these modes, particularly in the former; this effect being the more readily produced when the tumour is hard, cartilaginous, or osseous; or when it is very large, so as to interrupt by its size and pressure the transit of the more consistent contents of the bowels; or when an injury or blow is received upon or in the vicinity of the tumour. The lymph effused on the surface of an adjoining viscus will excite inflammation in whatever portion of the serous surface of the bowels, with which it may come in contact: enteritis thus occasionally appears consecutively upon inflammation of adjoining organs from the contact of a morbid secretion chiefly, and not from extension of the inflammatory process over a continuous surface. External injuries and wounds are occasionally causes of enteritis, particularly of serous or phlegmonoid enteritis; and gangrene of the injured and inflamed part sometimes takes place.

96. *D.* Mucous and follicular enteritis may occur *sympathetically* of some severe disease or extensive injury of external parts. Either of these varieties may be consequent upon burns or scalds, or upon erysipelas, or upon disease of some vital organ. They constitute, the latter variety especially, the most frequent complication of continued, and even of periodic fevers, and more particularly of the eruptive fevers; and they are often sequelæ of these fevers. My friend Dr. ABERCROMBIE, of Cape Town, informed me that, when measles were lately epidemic at the Cape of Good Hope, where they were imported after an absence of upwards of thirty years, the great bulk of the population being, in consequence, susceptible of their infection, enteritis sometimes occurred upon the decline of the eruption, but that it appeared much more frequently during convalescence, or a few days after the patient had apparently recovered.

97. IX. TREATMENT. — The *indications*, as well as the *means* of cure, necessarily vary in the several varieties of enteritis, and in the different circumstances in which they present themselves. Some reference ought also to be had to the causes which produced the disease, and to the state of vital tone or energy, especially if the complaint appeared in the course, or as a sequela, of any other. I shall

therefore describe the treatment most appropriate to the principal forms of the disease, and to the chief circumstances with which it is usually connected.

98. i. *Muco-enteritis* and *muco-entero-colitis* differ only in the extent to which the digestive canal is affected in its internal surface, and in the different portions of this surface; both varieties being the same in their natures and morbid relations. The means of cure are, therefore, equally suitable to both: — *A*. In the *slighter states* of the complaint, and in the less robust constitutions, *local depletions*, chiefly by leeches applied to the abdomen, will be generally requisite; but in strong, young, or plethoric persons, a moderate or full bloodletting from the arm should be premised. Immediately afterwards, small doses of calomel, or of blue-pill, or of the hydrargyrum cum cretâ, the last especially, should be given with ipecacuanha, or with the compound ipecacuanha powder, and repeated every four, five, or six hours. If the bowels be insufficiently evacuated, and if the stools be morbid and offensive, mild purgatives, as sweet oil, castor oil, or both, may be given, and emollient and aperient enemata administered. After these have operated satisfactorily, a warm bath or the semicupium may be resorted to, and Dover's powder, or the combinations of ipecacuanha just mentioned, may be exhibited so as to relax the external surface; and perspiration may be promoted by suitable diluents and warm mucilaginous fluids, or by these latter containing the liquor ammoniæ acetatis with the spiritus ætheris nitrici, and small quantities of the nitrate of potash. Or these may be taken in camphor julep, or any other suitable vehicle. When there is nausea or occasional vomiting, the medicines containing ipecacuanha may be laid aside for the latter preparations, which may be taken in small but frequent doses, in any emollient or soothing vehicle most grateful to the patient. In such cases, the stomach and bowels should be quieted, and their functions excited as little as possible until the morbid action has subsided. In mild cases, these means, aided by a farinaceous, mucilaginous, and spare diet, will generally be sufficient; but, in severer attacks, a repetition of the more active of these, and the aid of additional remedies, will be requisite.

99. *B*. When the disease occurs in the *most acute form*, particularly amongst Europeans in warm or inter-tropical countries, and as described above (§ 45.), a copious bloodletting ought never to be neglected; and the antiphlogistic treatment and regimen should be strictly enforced. In this state of complaint local depletions will often be requisite, even after blood has been taken freely from the arm, and will sometimes require to be repeated. Leeches may occasionally be applied around the anus, preferably to any other situation, more especially when any degree of congestion of the liver is suspected. If the attack be attended by vomiting, and the large intestines seem but little affected, calomel or the Hydrarg. cum cretâ may be given with opium, and repeated according to circumstances; the bowels having been sufficiently evacuated, and being kept open by copious oleaginous enemata; but, if the stomach be not irritable, after having evacuated morbid secretions and fæcal accumulations, ipecacuanha may be prescribed with opium and the nitrate of potass, as in the original Dover's powder, in as large and frequent doses as the severity of the case may indicate. After depletions have been sufficiently practised, the warm bath, semicupium, or hot fomentations, taking care to keep the bedclothes perfectly dry, may be allowed. In these cases, as well as in all the other varieties of enteritis, the more acute especially, the turpentine fomentation on the abdomen, or the liniments in the *Appendix* (F. 295. *et seq.*), employed as embrocations in this situation by means of warm flannels, will be found the most serviceable. As long as evidence is furnished of the presence of morbid secretions and fæcal collections, the milder mercurials and laxatives or aperients should be prescribed, and opiates withheld, until the causes of irritation are evacuated. The safest laxatives or aperients are sweet oil and castor oil, if they be perfectly fresh; but, if they be at all rancid, they will greatly increase the mischief. If these means, energetically pursued, do not remove the disease, it generally passes into the sero-enteric form, or into the second stage of that form, with marked exhaustion; a very different treatment being then indicated, although with little hope of success.

100. Upon the whole, the treatment of the milder forms of muco-enteritis should be nearly the same as is recommended for the more inflammatory varieties of Diarrhœa (§§ 27, 28.), and that of the more acute cases, particularly when the large bowels are chiefly affected, ought not materially to differ from what I have advised for the inflammatory states of Dysentery (§§ 82—87.); and the greater part of what I have stated in these places altogether applies to the present subject.

101. *C. The Chronic forms* of *Muco-enteritis*, and of *muco-entero-colitis*, require merely a modification of the above treatment, appropriately to the age, strength, and vascular states of the patient. Local depletions are sometimes necessary also in these forms of the disease, and should even be repeated according to circumstances. The chronic state is often owing to the indulgence of the patient in too much or too rich and stimulating food. When this is the case, then a more rigorous diet and regimen are requisite. A diet consisting chiefly of farinaceous and gelatinous substances, of milk, sugar, chicken or veal broth in small quantities with rice, &c., warm clothing, flannels worn next to the skin, warm baths, and assiduous friction of the surface of the body, aided by exercise, travelling and change of air, will generally be found most beneficial in these cases. But the disorder may have somewhat changed its character in passing from the acute to the chronic form: a too rigorous diet, during the former state, may have favoured the developement of follicular enteritis upon the subsidence of the inflammation of the villous surface. Consequently the persistence of a chronic disorder after the acute should lead to a careful examination of the local and constitutional symptoms, and of the evacuations; and if these be marked by asthenia, or cachexia, the stools being mucous, muco-puriform, or ochrey, and the pulse weak and very quick, the means about to be recommended for the follicular variety of the disease should be prescribed.

102. *D. In infants and young children* — *a*. the

acute form of *muco-enteritis* requires nearly similar means to those already prescribed, but with due reference to their age and their previous nourishment. For them, local depletions, the Hydrargyrum cum cretâ, with ipecacuanha in small doses, or Dover's powder, and the warm or tepid bath or the semicupium, or stupes or fomentations, will generally be necessary. — For infants, however, Dover's powder and all other preparations containing opium, ought not to be prescribed; nor, indeed, should the alvine evacuations be suddenly arrested by these, or other means, in young children. When the complaint is attended by much irritability of the stomach, a full dose of calomel will be of service, and if the child be not very young, a small dose of opium may be given with it; and the bowels, which are usually then costive, should be moved by emollient laxative enemata. When the stomach is not irritable, and the bowels are much relaxed, the stools being morbid, I have often found small doses of the bi-borate of soda taken in honey, or in dill-water with paregoric elixir and mucilage, of great service, after calomel or the Hydrarg. cum cretâ had been prescribed. In such cases, also, the warm bath, stupes and emollient enemata are very beneficial. In older children, when the bowels are very irritable, and the stools contain blood, small doses of the syrup of poppies, or of paregoric elixir, may be added to these or to the starch enema, or to an enema of thin gruel, or of warm water, or of strained veal or mutton broth; local depletions having been resorted to, according as they may have been indicated, and ipecacuanha or Dover's powder given in frequent doses. On the other hand, the bowels ought not to be allowed to be costive. When children will take sweet oil it is the mildest and most suitable aperient in this disease, and it should always be employed in laxative enemata. In the more severe cases, or after local depletions, the warm bath, fomentations, and suitable medicines have been prescribed, without satisfactory results, mustard poultices, or the warm turpentine fomentation may be resorted to, and be kept on the abdomen until smarting or burning heat is produced. Either of the turpentine liniments in the *Appendix* (F. 296. 311.) may be employed in this manner, with the addition of the tincture of opium, when the stomach or bowels are very irritable. — In grown children, opium with calomel or Hydrarg. cum cretâ, and with ipecacuanha, or this latter with nitre and opium, in suitable doses, are the most important remedies when employed after vascular depletion.

103. *b.* In the *chronic cases* of muco-enteritis, or of entero-colitis in *children*, repeated small doses of Hydrarg. cum cretâ, with ipecacuanha, or with Dover's powder, the warm bath, or fomentations, and subsequently blisters on the abdomen, if the foregoing means are inefficient, are generally necessary. But in this state of the complaint, diet and change of air, especially to a high and dry locality, are most beneficial. Advantage will be obtained, also, from the warm bath, followed by frictions of the surface, and the application of a flannel roller round the abdomen. The bowels should be duly regulated by means of mild mercurials, rhubarb, magnesia or sulphate of potash, or of sweet oil, castor oil, manna, &c., aided by enemata, according to the peculiarities of the case. In other respects, the treatment advised in the mucous and chronic states of Diarrhœa (30—36.) should be adopted.

104. *c.* In both the acute and chronic states of the complaint, the utmost attention should be paid to the *diet* of infants and children. When there is much irritability of the stomach indicating an extension of disorder to the duodenum and stomach, endeavours to give food or even medicine are more injurious than beneficial until the severity of the attack is abated by local depletions and external means. If a full dose of calomel with or without a little calcined magnesia is retained, as it generally will be in such cases, nothing ought further to be given for two or three hours, when gum-water with equal parts of the milk of a healthy nurse or of asses' milk, or gum-water slightly sweetened, may be administered in small quantity, one or two tea-spoonfuls being given at a time. In these cases, no other purgative than calomel will be retained in the stomach. The bowels must therefore be opened by means of the enemata already mentioned. The diet and regimen must entirely depend upon the state of the bowels. If they be relaxed, the milk may be taken with lime-water. As the acute symptoms subside, more nutritious kinds of light food and farinaceous articles may be allowed. Chicken broth or veal or mutton broth may be taken with rice; and mild tonics, with the alkaline subcarbonates and small doses of ipecacuanha, should be prescribed when the digestive functions are much weakened. The means so fully insisted upon in the several forms of Diarrhœa (see more particularly § 35—52.) may severally be employed according to the peculiarities of individual cases. In the sub-acute and chronic states of the disease, particularly in recently weaned children, or in infants that are attempted to be reared by hand, the kinds of milk just mentioned may be given, *immediately upon being drawn*, either with gum-water, or with a little cinnamon water, or with lime-water, or with barley-water, according to the states of the bowels.

105. ii. *Treatment of glandular and follicular enteritis* and *entero-colitis.* — *A.* The indications and means of cure in the *acute states* of these varieties entirely depend upon their exciting causes, their association with muco-enteritis, and the state of the constitutional disturbance. The *first* object is to ascertain the cause or causes of the malady; the *next* is to ascertain the state and stage of the local and general morbid action. It is necessary not merely to remove the causes, but also to counteract the poisonous influence they have exerted both locally and constitutionally. A reference to these causes (§§ 18. 83.) will show the necessity of thus extending our views in the treatment of these varieties. It must not be overlooked, that many of these causes are of a septic or poisonous nature — that they consist of putrid, decomposed, and decomposing substances, vegetable or animal, or both, which act as a poisonous or contaminating leaven upon the digestive mucous surface, on the intestinal glands and follicles, and upon the blood; and that this effect, although most demonstratively produced on these glands and follicles, does not always, at least in its earliest stage, consist of true or of sthenic inflammation. The vital condition of these follicles is changed, but not in such a manner as to develope an excited condition of their capillary circulation: an opposite state — an asthenic con-

gestion with impairment of their vital manifestations and vital cohesion — more probably obtains. For it is uniformly observed, that when the causes are of the above description, or when they are such as debilitate, or even such as insufficiently excite or nourish the frame, as inappropriate, innutritious, fluid and unwholesome food, a treatment of a lowering or depleting kind is always injurious. As this morbid condition of the glands and follicles of the digestive villous surface often rapidly passes into ulceration, it has been too generally viewed as being altogether of an inflammatory nature. This error has arisen from two circumstances; — *first*, the general belief that ulceration can proceed only from antecedent inflammation; and *second*, that inflammation is a state of vascular action always attended by one and the same condition of vital tone or power, and that the tissues affected by it possess the same degree of vital cohesion on all occasions. Now I have shown, in other places, that ulceration may occur and proceed without any appreciable grade of inflammation, and more particularly of true or sthenic inflammatory action; and that inflammations, or rather that the states of local vascular action, to which the term inflammation has been too generally and often inappropriately applied, are widely different from each other, in respect of a great variety of both local and constitutional phenomena; and that these states vary, as regards the condition of the tissues and vessels, and circulating fluids and vital manifestations, not only in each of their more specific forms, but also in each of their progressive periods or stages. It may therefore be inferred that, when ulceration is produced in the intestinal glands by septic or contaminating ingesta, it assumes somewhat of a phagedenic character, and that the state of vascular action preceding or giving rise to this effect is either not truly inflammatory, or is that to which I have applied the term of *asthenic inflammation* (see that article, § 54. *et seq.*), and which requires, both locally and constitutionally, a very different treatment from that appropriate to the more common inflammatory condition.

It is not improbable, however, that inflammation commencing in the villous surface itself will extend to the follicles, and even that both it and the follicles may be almost coëtaneously attacked; or that the affection of the former may subside as that of the latter is developed; but of either of these states of disease we have no certain proofs at an early stage, although appearances after death frequently show that they must have existed. The chief difficulty is to ascertain the symptoms by which they are severally, or conjointly, attended and indicated, more particularly during early periods of life, when this morbid association is common; and even at much later periods so minute a diagnosis as this is can rarely be made with precision. When we have reason, from the nature of the exciting causes, from the character of the symptoms, and especially from the state of the evacuations, to infer that disease of the follicles is associated with inflammation of the villous surface; or when the more usual phenomena of follicular enteritis cannot be connected with the septic and lowering causes mentioned above (§§ 18. 85.), and when the symptoms indicate more or less of vascular excitement, locally or generally, local depletions, followed by the warm bath, by the semicupium, or by the rubefacient embrocations or fomentations already noticed (§§ 296. 311.), will then be requisite. If fæcal collections have not been removed by the natural action of the bowels, calomel with rhubarb, or the latter with sulphate of potash, or the compound jalap powder may be given, and be aided by suitable injections: afterwards, frequent doses of the Hydrarg. cum cretâ, with Dover's powder or with ipecacuanha and rhubarb in small quantity, may be prescribed, according to the circumstances of the case; and the turpentine fomentations already mentioned (§ 99.), may be applied on the abdomen. The treatment in such circumstances should not vary materially from what is advised for the more acute forms of *mucous diarrhœa* (§ 99.), and for *dysentery*, according to the features of individual cases.

106. After the more acute symptoms have subsided, and in the more asthenic cases, more restorative, astringent, and antiseptic remedies may be employed; and more especially those recommended for the *mucous* and *chronic forms of* Diarrhœa (§ 31. *et seq.*). If the stage of the disease, the state of the evacuations, and the constitutional symptoms, indicate the accession or progress of *ulceration*, the means advised in the article just referred to (§ 32. *et seq.*) should be resorted to. In such cases, as well as in those which have followed the ingestion of septic and contaminating substances, I have found the following of more or less service with or without the addition of opium to either of them, as circumstances may have required.

No. 279. ℞ Hydrarg. cum cretâ ℈ j.; Pulv. Ipecacuanhæ gr. viij.; Pulv. Rhei ℈ ij.; Creasoti ♏ xij.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ xviij. quarum capiat duas ter quaterve quotidie.

No. 280. ℞ Pulv. Ipecacuanhæ gr. xvj.; Argenti Nitratis Pulver. gr. viij.; Extracti Humuli ℈ iv.; Extr. Papaveris ʒ ss.; Olei Carui q. s. Tere bene et forma in massam æqualem quam divide in Pilulas xxxij., quarum capiat unam vel duas ter quotidie.

No. 281. ℞ Calcis Chloridi gr. ss. ad gr. j.; Aquæ Cinnamomi ʒ ix.; Mucilag. Acaciæ ʒ ij.; Tinct. Camphoræ Comp., Tinct. Humuli, Tinct. Cardamom. Comp. āā ʒ j. M. Fiat Haustus, pro re natâ sumendus.

No. 282. ℞ Calcis Chloridi Pulv. gr. viij.; tere cum Pulv. Tragacanth. Comp. ʒ j. et adde Pulv. Ipecacuanhæ gr. viij.; Bals. Peruv. q. s. ut fiant Pilulæ xviij.; quarum capiat duas ter quarterve in die.

107. *B. The chronic states of follicular enteritis*, and *entero-colitis*, particularly when ulceration has commenced, can be ameliorated or cured only by strict attention to diet and regimen, as well as by the appropriate use of medicine. Of the latter, but little can be added to what has already been stated with reference to the treatment of *chronic mucous diarrhœa* (§ 31. *et seq.*), and *chronic dysentery* (§ 100. *et seq.*). The various methods and diversified means there enumerated are appropriate to the states of the disease now under consideration; and the treatment recommended for chronic muco-enteritis is also partially applicable to them. In the follicular form, however, of chronic entero-colitis, the means of cure, both medicinal and dietetical, should be even more restorative than I have advised for the other varieties of enteritis. In many cases, both medicines and diet should be prescribed almost experimentally, the effects of both being carefully watched; for it is impossible to infer correctly the effects of the several means in all or even in the great majority of cases. In many instances, and in several circumstances in which they occur, powerfully tonic and astringent remedies are most beneficial; whilst in others

alterative and absorbent medicines are most useful. A spare and farinacious diet is usually recommended; and yet abstinence may be carried too far, nutritious and digestible food being often required, especially when the disease is prevailing epidemically, or when it proceeds from the more debilitating and contaminating causes. In addition to the means already mentioned, both here and in the articles just referred to, others variously combined, according to the ever-changing features of individual cases, may be employed, more especially sulphate of quinine; or the nitrate of silver, with camphor and the extracts of hop and of poppy; the sulphates of quinine and of iron with these extracts, or with catechu, purified ox-gall, and capsicum; the sulphate of zinc or of copper, or the acetate of lead, with ipecacuanha and opium; the tincture of the muriate of iron, or chlorine-water, with the compound tincture of camphor or of cinnamon; and any of the various astringents, tonics, and absorbents, usually employed. In this variety of the disease, the chloride of lime, or the chlorate of potash, or any of the mineral and vegetable astringents, tonics, and antiseptics, may be prescribed according to circumstances: but those astringents which are also antiseptics should be preferred; and be conjoined with the preparations of bark, or of cascarilla, or of tormentilla, &c. When the follicles and glands of the large bowels are chiefly affected, and the disorder has become chronic, or if ulceration be expected, many of the substances just mentioned may be employed in enemata, as the nitrate of silver, the sulphate of zinc, lime-water, chlorine-water (*Pharm. Dubl.*), the infusion or decoction of bark with the compound tincture of camphor, or syrup of poppies; the chlorate of potash, or the chlorides similarly combined; and the various astringent and tonic infusions and extracts.

108. *For infants and children* affected by acute or chronic follicular enteritis and entero-colitis, very nearly the same means as have been advised for them, when suffering under muco-entero-colitis (§§ 102, 103.), will be found appropriate. As, however, the follicular variety of the disease in this class of patients is more especially caused by insufficient or unwholesome nourishment, by an unhealthy nurse, by a spoon diet, by rearing by hand or premature weaning, by cold and humidity, and particularly by living in a miasmatous atmosphere, or in low, damp, and ill-ventilated cellars and apartments, a removal of these causes, and attention to suitable diet and regimen, become most important parts of the treatment. The patient should be warmly clothed in flannel, and always sleep in the arms of a healthy nurse, or have asses' milk warm from the animal. The diet should be regulated in other respects as already advised (§ 104.). In this, and in similar states of disease of the digestive canal, the jelly prepared from the Ceylon moss is a most appropriate article of food. In aid of these means, change of air, particularly from crowded towns, and low, close, or unhealthy localities, to open, airy, dry, and temperate situations, or to the seaside, should always be prescribed.

109. iii. *Treatment of phlegmonoid or sero-enteritis.* — When the inflammation either seizes primarily upon the substance of the intestines, or extends to it, or commences in the peritoneal coat, vascular depletion should be immediate and copious, and other remedies promptly employed. If the patient be plethoric, young or robust, blood should be taken very largely from the arm, and leeches applied afterwards upon the abdomen. A full dose of calomel and opium — from fifteen to twenty grains of the former and two to three grains of the latter, with or without a grain or two of ipecacuanha, according to the state of the stomach — ought to be taken immediately after the bleeding, and the hot turpentine fomentation applied over the whole abdomen. This last should be kept constantly applied, or should be renewed, until the symptoms have abated. If the stomach be irritable, the calomel and opium taken after the bleeding, and without the ipecacuanha, will remove this symptom, and will, particularly when aided by the hot turpentine fomentation, determine the circulation to the surface, equalize the distribution of blood, and promote perspiration; and when the fomentation can be no longer endured, a warm bread-and-water poultice may replace it, and may be frequently repeated. If these means give relief, with a copious and general perspiration, the patient should not be disturbed for a considerable time, nor the stomach and bowels irritated by purgatives or cathartics taken by the mouth; and as soon as it becomes requisite to procure evacuations and to remove offending matters, the oleaginous or other mild purgative enemata may be administered.

110. If the disease be very severe, or considerably advanced before this treatment is instituted, a repetition of both the general and local bleeding will often be necessary; and the calomel and opium, in the doses already stated, may be given once or twice daily, either until the secretions and evacuations become free, or until the mouth is affected, or the symptoms disappear. If the stomach be not irritable, and if the bowels have been evacuated, saline medicines may be prescribed at intervals; and the warm bath may be ordered, with the view of aiding the preceding means in equalizing the circulation and promoting perspiration. If the biliary functions be much disordered, or if the disease does not yield readily to the above means, the mercurial liniment or ointment may be placed upon the surface of the abdomen, and covered by a succession of warm poultices, or the former of these may be laid upon the surface of the poultices that is to be applied next to the abdomen. If this state of the disease be associated with hepatitis, local depletions below the right scapula, or over the right hypochondrium, should precede these applications.

111. As to the use of blisters in enteritis, much discretion is requisite. If they be employed before the disease, particularly this form of it, be in a very great degree subdued, they either fail of being serviceable, or they aggravate the morbid action; unless they are so large as to occasion a complete revulsion of the capillary action to the blistered surface — an effect they can seldom produce, unless the inflammatory action is slight in degree or small in extent, or has been nearly altogether removed by the previous treatment. In the early stages of the disease, the turpentine fomentation is greatly to be preferred, as it in no way aggravates the disease, but, on the contrary, remarkably tends to abate it, and to prevent the effusion of coagulable lymph, and in this, as well as in other ways, aids the beneficial operation

of bloodletting and mercurials. When, however, the disease is nearly subdued, the external inflammation and discharge produced by a large blister entirely remove the remaining morbid action, and prevent an exasperation or a return of it. In this period of the disease, and after the above fomentation has been used, a large blister may therefore be applied, and the discharge from it promoted by poultices and other means.

112. iv. *Enteritis with membranous or tubular exudations* is generally a chronic disease, and much less amenable to treatment than any other variety. M. Roche states that M. Burdin, a physician of large experience in Paris, informed him that local depletions, poultices, warm baths, emollient enemata, and a soothing regimen, proved most beneficial in his practice; and that a mucilaginous, diluent, and fluid diet was generally injurious; whilst mild bitter infusions, aromatics, and antispasmodics were preferred: and the former physician adds, that his experience accords with this statement. However, he has seen a case exasperated by the slightest stimulus, and cured by a severe antiphlogistic regimen; and another cured by drastic purgatives after other means had failed. Dr. Powell observed no benefit from the use of calomel. The practice which appeared to him most advantageous was the steady use of a mixture of the compound infusions of gentian and senna, with the addition of from ♏ x to ♏ xx of the solution of potash, so as to procure four or five stools in the twenty-four hours. Sir B. Brodie informed me that he has found small doses of cubebs serviceable in this disease, aided by an occasional recourse to an active purgative. The purgative advised by Dr. Powell has been most beneficial in my practice; but I have found it requisite to apply leeches to the abdomen, followed by the turpentine fomentation and embrocation, by hot poultices, and emollient enemata. A frequent use of sweet oil, both as an article of diet and as an aperient, has also been of service. A light, nutritious, and solid diet has been generally requisite; at the same time avoiding stimulants and irritants. The treatment, however, will necessarily vary, or even be entirely different, in different cases, as the disease has always been variously associated or complicated in the cases which I have seen; these complications often requiring as much attention as the intestinal malady.

113. v. *During convalescence* from any of the several forms of enteritis, the regular action of the bowels is a matter of the greatest consequence, and should be promoted, when deficient, by mild and cooling aperients and laxatives. At the same time the secretions generally, and particularly the biliary secretion, should be corrected or promoted whenever they are deficient or morbid. For this purpose, an occasional dose of blue-pill or of the hydrarg. cum creta, or of Plummer's pill with soap, should be taken. A warm bath, followed by active friction of the surface with hair gloves, or with a coarse towel, will also be of use. The utmost attention ought to be paid to *diet*. A returning appetite should be indulged with great caution. Mild broths, in small quantity, with toast, or with boiled rice; the farinaceous articles of food, as arrow-root, sago, tapioca, &c.; and the jelly of the Ceylon moss, may be taken at first, and continued for some time before more stimulating and solid articles are allowed. The patient ought to wear flannel next his skin, and be careful not to expose himself to vicissitudes of temperature, or to moisture. He should always preserve his feet warm, and observe those articles of food which agree or disagree with his digestive organs, carefully avoiding those which have the latter effect. In all respects his diet and regimen should be regulated in the manner advised in the article Indigestion (§ 69. *et seq.*).

114. X. Of Spasm, etc. of the Intestines. — *A.* The muscular coats of the intestinal tube possess a very perfect degree of muscular power, and may be contracted in a very remarkable manner; even so as to propel quicksilver along its canal contrary to the specific gravity of this substance. The extent of spasmodic contraction of the intestines is rarely demonstrated to the sense of sight, even after death. But in dissections performed a few hours after dissolution it has been observed so extreme as very nearly to obliterate the canal. The spasmodic contraction of circular fibres, and of the muscular coats of hollow viscera, is shown by the action of the urinary bladder, of the intestines, and of the sphincters; and the extent of relaxation of these structures is demonstrated by the state of these parts both in health and disease. The healthy contractions of the intestinal canal push onwards its contents; but this contraction is speedily followed by relaxation. The passage of substances more or less stimulating along the villous surface excites the action of the muscular coat, and this action ceases in one part as soon as the stimulus passes onwards to a continuous part. Where, however, the muscular coats are spasmodically contracted there is, at least for a more or less considerable time, no consequent relaxation, as in the healthy state. It is very difficult to determine the extent to which spasmodic constriction takes place, in respect either of the amount of the obliteration of the canal it may occasion, or of the length to which it may affect the intestine, and the particular bowel affected. The spasm, there is every reason to infer, indeed it is sometimes demonstrated, may attack several parts at the same time more or less remote from each other, the intermediate portions being remarkably dilated; and it may proceed along the intestinal canal, either continuously or interruptedly, from the stomach downwards, or even in an opposite direction, as in colic, hysteria, and ileus, in which it may follow either of these directions. We can hardly suppose that the spasm extends, at the same moment, to the whole line of the canal, but merely to portions of it, which may be thus affected for a very varying and indefinite period. This affection may pass with rapidity from one part to another; and, as respects duration and recurrence, it may be continued, almost permanent, intermitting, remitting, periodical, and slight or tremulous. Some portions of the bowels are more subject to spasmodic action than others; as the duodenum, the lower portion of the ileum, and the lower parts of the large bowels.

115. *B.* Intestinal spasm is generally *associated* with disorder of the secreting functions of the liver, and of the digestive villous surface; and often also with inflammatory action in this surface. There is always more or less of irritation of this tissue, or rather of the nervous fibrils supplying this and the muscular coats; and this irritation is attended

by a more or less remarkable alteration of the sensibility of these nerves, which is roused often to the most acute pitch of sensation.

116. i. *Symptoms.*—The symptoms of spasmodic constriction of the intestines necessarily vary with its seat, degree, extent, duration, causes, and concurrent changes. In the great majority of cases they constitute the disease denominated *colic;* and in their more extreme or prominent state, particularly when spasm is associated with further change, or consists of a succession of retrograde actions emanating from a part more permanently contracted or obstructed, they constitute, or very nearly approach, the *iliac passion*, which, however, is often dependent upon obstruction from some other cause, and is frequently associated with inflammation. *Pain* is the most general attendant upon spasm, and, like it, is usually felt in paroxysms, or is exasperated, or is recurrent, intermittent, remittent, and more or less acute or violent. In some cases it is slight and irregular, or it assumes the above forms in a much less acute grade, as in the spasmodic intestinal contractions of *hysteria*. The pain characteristic of spasm is often more or less allayed by pressure, unless the spasm be excited by inflammatory action or associated with it. When the spasm affects the small intestines, there is commonly pain about the navel; and when it is attended with flatulent distension of the parts unconstricted, there is a tympanitic state of the abdomen, with borborygmi, and a sensation of the passage of air from one part to another, the pain often also shifting its situation. Spasm of the duodenum has been supposed to be indicated by pain in the right side, stretching to the back, and occasionally to the right shoulder, but often changing its place upon the expulsion of air; by distension of the abdomen, slight yellowishness of the conjunctiva or countenance, and deficiency of bile in the evacuations; and by a soft and sometimes an irregular pulse. These symptoms, however, do not furnish sufficient evidence either of the seat or of the nature of the affection, although they are attendant upon it in most instances; for they also accompany other complaints, more especially torpor and other functional disorders of the biliary organs. When the pain accompanying them is eased by pressure, and when none of the signs of inflammatory action is present, then the existence of spasm is extremely probable; but its seat is not the more certainly indicated by this circumstance. Nor does pain in the right side extending from the cæcal region to the right hypochondrium sufficiently prove the existence of spasmodic constriction of the commencement of the colon, although it is a sufficient reason to suspect the presence of this affection in this part. Both SAUVAGES and MONRO admit the difficulty of the diagnosis as respects the seat of spasm. This, however, is of the less importance, as the treatment is the same whatever may be its exact seat. But it is of the utmost moment to ascertain whether or not the spasm be caused by, or associated with, inflammatory action, or structural lesion; and this can be detected only by a careful examination of the previous history and present state of individual cases. The disposition, particularly in young subjects, of intestinal spasm to be followed by intus-susceptions, and by inflammation or ileus from this circumstance, should always be kept in recollection.

117. ii. *The Causes of Spasm of the Intestines* are also those of spasm in other parts.—*a.* The nervous temperament, and the delicately or weakly constituted, owing either to original conformation or to the operation of the usual causes of debility during infancy, puerility, and puberty, are most *predisposed* to this affection. Dr. GREGORY has very correctly and briefly stated the predisposing causes as follows:—"Habitus corporis nimis sentiens, et nimis mobilis, homines spasmis opportunos reddit; hinc malum fœminis, infantibus, debilibus, luxuriosis, desidibus, sanguine plenis, familiare."

118. *b.* The *exciting causes* are principally those which irritate the villous surface of the intestines, as all acrid, poisonous, or unwholesome ingesta; flatulence, acrid bile, retained or morbid secretions and excretions, mechanical irritants, calculi or concretions, foreign bodies, worms, biliary calculi either passing the biliary or other ducts or lodged in the intestines, exposure to cold, &c. Intestinal spasm is often caused by inflammation of the bowels, or by organic lesions implicating their coats; by the poison of lead, and by the numerous causes mentioned in the article on the several forms of COLIC and ILEUS. It is also frequently occasioned *sympathetically* by the irritation of dentition; by irritation or inflammatory action in the uterine organs, or in the urinary passages; and by affections of the mind, especially the more violent emotions. It is a frequent attendant upon hysteria, upon calculi in the kidneys or ureters; and it occasionally appears in the course of disorders of distant parts. It is also apt to occur in the gouty diathesis, either as misplaced gout, or in consequence of disorder of the biliary or intestinal secretions.

119. iii. The *treatment* of intestinal spasm does not differ from the treatment of *colic* and *ileus*, and it should be conducted according to the principles there detailed. The chief *intentions* are,—1st, To remove the cause or causes, whether those acting directly on the bowels, or those exerting a sympathetic effect: 2d, To remove the immediate attack: 3d, To combat associated or contingent disease, whether inflammatory or structural: and, 4th, To prevent a recurrence of the affection by such means as will prevent accumulations of morbid secretions and excretions, and promote a healthy condition of the secretions, whilst they restore the tone of the parts and of the system generally. It is unnecessary to describe the modes in which these indications may be carried into effect, as they are already stated in the article just referred to, and as they necessarily differ according to the peculiarities of each case. I may, however, remark that the use of opiates or of other narcotics should not be long persisted in, with the view of accomplishing the second intention, without alternating or combining them with mild purgatives or laxatives, or with deobstruents; taking care, at the same time, to remove inflammatory action, if it be present in any degree. Narcotics, especially opium or morphia, interrupt the biliary and intestinal secretions and excretions; and, although the latter is extremely efficacious in removing spasm, yet it counteracts the other indications. Much, however, will depend upon the modes of combining or prescribing it, and upon the other means employed. Hydrocyanic acid is often a most efficacious remedy in this affection. In the violent forms of it which sometimes occur in

the gouty diathesis, opiates and the hydrocyanic acid have been most efficacious, in my practice, particularly when given with camphor and an alkaline carbonate, or with the carbonate of magnesia or of ammonia, due attention being paid to the excretions, both fæcal and urinary. Belladonna is frequently of service, given either internally or applied by means of a plaster over the abdomen. The administration of narcotics or anodynes in enemata is occasionally beneficial; but I have seen the doses of those medicines recommended by some writers produce very serious effects. The spirit of turpentine thus employed is an efficacious remedy, especially when much flatulent distension is associated with spasm, and particularly when its antispasmodic operation is aided by the external application of it, in the form either of epithem, embrocation, or liniment, over the abdomen. Numerous other means may be resorted to in the different states of intestinal spasm. But they are fully noticed in the article on Colic and Ileus (§ 50. *et seq.*) The fact of spasm being not infrequently a consequence of congestion of blood, of local determination, and of inflammatory action, either latent or manifest, ought never to be overlooked in the treatment of these affections, more especially in the young and plethoric, and in those who live fully and take insufficient exercise.

120. XI. A Paralytic state of the intestinal canal occurs, but only in respect of portions of it, and much more rarely than the affection just noticed. Palsy even of a portion of the intestines is seldom complete. It is rather a state of over-distension or of inflation, during which the usual vermicular or peristaltic contractions of the bowel do not take place for a time; but this state is more rarely permanent: it generally disappears either gradually, or after the use of medicine or stimulating articles of diet. In its more extreme forms, it is occasionally consequent upon permanent or spasmodic constriction, or incarceration or strangulation, or other obstruction of a portion of bowel, and is commonly seated above the constriction; the inordinate distension caused either by flatulence, or by fæcal accumulations, or by both, as well as by the unceasing efforts to propel the contents of the distended intestine onwards, ultimately terminating in a loss of contractile power. In addition to these sources of partial palsy of the intestines, hysterical affections, irritation of the uterus, and more particularly diseases of the spinal chord or its envelops, causing more or less of paralysis of voluntary parts, may be mentioned.

121. A paralytic state of a portion of the intestines, particularly when consequent upon permanent contraction of a part immediately below it, is often followed by serious changes in the palsied portion. The secretions of its villous surface are suspended, and inflammatory action, quickly passing into ulceration, or even sphacelation, soon supervenes. Indeed, these consecutive changes may take place even in those parts which are not completely paralysed, but which, having lost much of their contractile power, continue more or less distended; this condition, in connection with the influence of accumulated and pent-up flatus, arresting the secretions of the part, and favouring the occurrence of inflammatory action and its usual consequences. In cases where permanent contraction, or obstruction, of a portion of bowel exists, from changes about to be noticed (§§ 127, 128.), the parts immediately above the contraction are generally found inordinately dilated, ulcerated, ruptured, or even sphacelated; and others still higher up the bowel are occasionally spasmodically constricted,— changes resulting from the inordinate efforts made to propel the contents of the intestines. A partially paralysed state of the bowels may likewise proceed from inflammation of the part thus affected, the muscular coats being thereby rendered incapable of contracting.

122. i. *The symptoms* of palsy of the intestinal canal are chiefly constipation, distension, with a tympanitic state of a part or of the whole of the abdomen* upon percussion; a weak, quick, small, and often an irregular pulse, and occasionally vomiting. — The other symptoms vary with the changes either occasioning, or associated with, the palsied condition — with the presence of inflammation, of disease of the spine or spinal chord — with uterine or urinary irritation, or with hysterical affections. When the spinal chord is seriously affected, and in certain severe forms of hysteria, the urinary bladder is often also paralysed; and the voluntary muscles, particularly those of the lower extremities, and sometimes those of the abdomen and superior limbs, are similarly affected.

123. ii. *The treatment* should be conducted with a strict reference to the source of the affection, and to the disorders attending or complicating it; and this can be accomplished only after a strict examination of the history and existing state of each case. If the loss of contractile power proceed from a more or less permanent contraction, or from incarceration or strangulation of a portion of bowel, or from pressure or some other mechanical cause of obstruction, the removal of the source of mischief is the primary object of treatment. Other associated lesions just mentioned also require immediate attention, as either causing or perpetuating the palsied state. It is comparatively rare that this affection of the intestines is primary and uncomplicated; and it is consequently but seldom that the means of cure should be solely directed to it. But when it is thus primary and simple, or dependent upon disease or injury of the spine, warm purgatives and carminatives, given by the mouth and administered in enemata, are then beneficial; and these may be combined with various antispasmodics, more particularly those just mentioned (§ 119.). If, however, there is any reason to suppose that the loss of contractile power is either a consequence of, or associated with, inflammation of the bowel, or even that the distended portion of intestine has passed into this state, then these means may be more injurious than beneficial, and the usual remedies for enteritis, according to the state of local and general action, and of constitutional power, should be resorted to. In such cases, a careful examination of existing symptoms, and the presence of those already shown to attend the several forms of en-

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* In some cases of *lead colic*, I have found the colon so enormously distended from flatus and loss of contractile power, that I could distinguish its form and course, in the different abdominal regions, by the eye when standing at a considerable distance from the patient; and yet the bowel has been restored to its healthy state by repeated injections containing turpentine, castor oil, &c., aided by stimulating frictions on the spine, abdomen, &c.

teritis, will guide the practitioner, both in the diagnosis, and in the treatment.

124. XII. Rupture of the Intestines is generally a consequence of pre-existing disease of the ruptured part or its vicinity. It never takes place in the healthy bowel, unless when caused by external violence, as the kick of a horse, or the passage of a carriage-wheel over the abdomen. — *A*. The *symptoms* vary in these cases according to the amount of hæmorrhage which takes place from the ruptured part. But the vital powers always evince great depression from the shock and the nature of the injury; the features becoming pale and collapsed, and the pulse feeble, small, or slow, and the surface and extremities cold. There is also very acute pain in the abdomen, with vomiting or syncope, in most cases.— When the rupture proceeds from softening or ulceration, there is seldom any hæmorrhage, and the symptoms are nearly those which arise from perforation of the intestines; great and general distension, pain and tenderness of the abdomen, a small frequent pulse, vital depression, vomiting, constipation, decubitus on the back with the knees drawn up, and the other symptoms of peritonitis, from effusion into the peritoneal cavity being present.

125. The *treatment* in the above circumstances consists chiefly of the exhibition of full and frequent doses of opium and of perfect quiet; but it is more fully stated in the article Peritoneum.

126. XIII. Thickening and permanent Contraction of a Portion of Intestine.—These lesions, whether consequent upon inflammation, or produced by constitutional vice, and impaired organic nervous power, have been fully described in the articles Digestive Canal (§ 48. *et seq.*) and Colic and Ileus (§ 33.). In their slighter forms and earlier stages, they are not always, or even generally, attended by such symptoms as will enable the physician to form a correct idea of their nature, or to infer whether or not they are simply obstructive or, in addition, of a malignant character. In many cases, where this latter character exists, the malady is far advanced before the symptoms marking its nature become fully manifested; and in some it is even neither supposed nor detected until disclosed by an examination after death.

127. i. *Thickening and permanent Contraction* of the coats of a portion of intestine are usually conjoined. It is but rare that the one exists without the other. They are much more rarely observed in the small than in the large bowels. They are usually attended, in their early stages, by costiveness or by constipation, alternating with diarrhœa and colicky pains. The symptoms, however, vary according to the seat of a partial, or of a more or less complete, obstruction. (See Colic and Ileus, § 32. *et seq.*). When they are seated in the small intestines, vomiting frequently recurs with twisting pains, occasionally with a gurgling noise about the umbilicus, and the matters vomited are often more or less digested. When they implicate the ileo-cæcal valve, or the vicinity, pain is generally felt in the cæcal region; and if the obstruction be not complete, the fæcal matters which have passed into the large bowels, together with the decretions and excretions from their surface, generally form scanty and costive evacuations. When the obstruction is more complete, the sufferings of the patient are greater, the evacuations are scantier, and the bowel above the obstruction becomes more dilated and tympanitic, ultimately inflamed, and occasionally ulcerated, or even lacerated, or gangrened. In such cases, the abdominal tension, tenderness, and pain, the frequent small pulse, vomiting, &c., indicate the existence of inflammatory action; and the appearance of the vomited matters, and the seat or commencement of the suffering, suggest the portion of intestine affected. In most cases, the abdomen is very resonant on percussion; but if the obstruction be caused by much thickening of the coats of the intestine, there is marked dullness of sound on percussion in the situation of the part thus affected. The parts most liable to thickening and constriction of the coats, are the sigmoid flexure, and the arch of the colon. When this change exists low in the colon, the fits of vomiting are less frequent, and the evacuations at stool much scantier and less frequent, than when it is seated either in the small intestines, or at the commencement of the colon. Even when the disease is in the sigmoid flexure of the bowel, as much fæcal matter may pass into the rectum, as long as the canal is at all open, although remarkably constricted, as will form a consistent stool, by its accumulation and retention at the termination of the colon, and in the rectum. Thickening and permanent contraction in the small or large intestines, may be distinguished, with some probability, by the seat of pain and swelling, and of the gurgling noise caused by the passage of matters through the straitened part. If the contraction be in the colon, its situation may often be detected by observing how much fluid can be thrown up, and by consulting the feelings of the patient, whilst it is being thrown up, in addition to the other indications just noticed.

128. ii. When *scirrhus* or *carcinomatous* or *other malignant chronic disease* attacks the intestines, either primarily or consecutively (see Digestive Canal, § 48. *et seq.*), it is generally attended not only by great thickening or hypertrophy of the coats, particularly of the sub-villous or cellular tissue, but also by very marked constriction of the canal. Tumours of various sizes, or fungous excrescences, sometimes sprout out from the diseased or ulcerated surface, which tend still further to lessen the aperture through the diseased part. The larger intestines, and particularly the cæcum, the ileo-cæcal valve, the sigmoid flexure of the colon, and still more the upper part of the rectum, are more frequently the seat of cancerous or malignant chronic disease than the small intestines.

129. iii. The *symptoms* of these changes are generally obscure, for they always come on imperceptibly and slowly. Distension of the bowels; more frequent calls to stool than usual, with difficulty and pain in passing the fæces; colicky pains, and stools consisting chiefly of frothy mucus, often tinged with blood, are amongst the earliest symptoms of the disease. The evacuations are only in small quantities at a time, are thinner than natural, and when consistent are much narrower, or mixed with a frothy or slimy mucus. Emaciation takes place, and the pulse becomes quick and feeble. As the disease proceeds, very acute lancinating pain is felt in some part of the abdomen, commonly the seat of lesion. When the patient is at stool, flatus passes through the diseased part, sometimes with a hissing sound and tremu-

lous motion. As the contraction increases, the quantity of fæces discharged is diminished, and abdominal distension, pain, and tension are increased. Occasional vomitings supervene, and become more and more frequent, the matters ejected being more digested or more nearly approach the fæculent appearance as the malady advances to a fatal termination. In some cases a distinct tumour may be felt, or its seat indicated by a dull sound and pain on percussion. I was lately consulted in a case of carcinoma, seated a little above the sigmoid flexure of the colon, which occurred in a medical man aged about 40, where the seat of the disease was thus indicated. The other circumstances also, already noticed, will further aid in forming an opinion as to the seat of mischief. The malady usually follows a slow but uninterrupted course, during which the swelling of the abdomen, pain, vomitings, and constipation increase. The countenance and general surface in this last stage commonly present the cachectic appearance usually observed in CANCER (§ 11.). At last inflammation, ulceration, or even rupture or gangrene, often takes place in the over-distended portion of bowel above the cancerous part, and the patient rapidly sinks; — syncope, cold sweats, singultus; feeble intermitting pulse; cold extremities, &c. ushering in dissolution: but the disease occasionally terminates in fatal exhaustion, without these alterations supervening, and without the symptoms of ileus taking place in a very violent form.

130. iv. Of the *treatment* of these changes but little can be said, more than will be found in the articles COLIC and ILEUS (§ 71. *et seq.*), and CONSTIPATION (§ 21.). I have seen temporary benefit derived in some cases, from small but frequent doses of Castile soap, ipecacuanha, and hyoscyamus; in others, from the purified extract of aloes, conjoined with the biborate of soda and conium. The frequent use of small quantities of sweet oil, so as to preserve the bowels in a freely open state, or the adoption of the oil instead of butter as an article of diet, has been of service in several instances. The injection of considerable quantities of it into the large bowels has also proved beneficial in the advanced states of the disease. A liniment consisting of the mercurial and compound camphor liniment with opium may be rubbed over the part of the abdomen chiefly affected, or the ammoniacal and mercurial plaster may be worn over this part. The *diet* should consist of such articles as are the least excrementitial or furnish the smallest proportion of fæcal matters.

131. XIV. SOFTENING OF THE VILLOUS MEMBRANE OF THE INTESTINES.— *Maladie Gastro-intestinale avec Désorganization Gélatiniforme*, CRUVEILHIER. — This lesion is fully described in the article DIGESTIVE CANAL (§ 34. *et seq.*). It occurs chiefly in infants and young children; and is distinct from the softening caused by inflammatory action. SOFTENING, as shown in that article, may be primary and idiopathic, and, in this form, is not unfrequently seated in the villous surface of the stomach and intestines, or of either more especially. It generally proceeds from causes which greatly depress the organic nervous power, and rarely takes place in adult persons, in whom, however, M. CRUVEILHIER, who first correctly described the disease, met with several instances. Of 50 cases observed by DR. ROMBERG, 6 occurred from the 1st to the 3rd month, inclusive; 17 from the 4th to the 6th month; 7 from the 7th to the 11th; 14 from the 12th to 24th month; and 6 from the 2d to the 5th year of age; the periods of weaning and teething being those during which it is most frequent.

132. i. *Symptoms.* The earliest indications of this disease are frequent, watery, greenish, slimy or mucous stools, often mixed with yellowish flakes, and having a peculiar offensive acid or putrid odour; occasional vomitings, of acid, ropy or mucous matters, and extreme thirst; acute sensibility, perpetual restlessness and fretfulness, and screaming or crying on being touched, or upon being roused from the state of exhaustion or of lethargy into which the infant generally sinks. Fever is observed at the commencement of some cases, but it is slight, and of short duration, and more commonly the skin is cool from the beginning. The surface becomes cool or soon cold, pale, flabby, and sickly, as the disease proceeds; and the countenance is also pale, cold, sickly and sunk. At an advanced stage there are a slight or short cough; remarkable exhaustion or sinking; a short or interrupted respiration; frequent crying and moaning; much apparent anxiety and restlessness; coldness of the extremities, with rapid emaciation and extreme debility; an irregular, languid, small and weak pulse; a white, pale, or slimy tongue; a soft, relaxed, sometimes inflated, but never a tender or painful state of the abdomen; and pale or whitish urine.

133. *The duration* of this malady varies from a few days to several weeks, or even to two or three months. When the patient is carried off more rapidly, disorder of a slighter form has existed for some time previously. When the disease proceeds unfavourably, a violent exacerbation, or a gradual exhaustion or sinking of the vital energy, usually terminates life. The sensorial functions, in these cases, are not oppressed by sanguineous congestion, or by aqueous effusion, but cease in consequence of the general vital depression and the extensive lesion of the intestinal canal.

134. ii. *Diagnosis.* If this disease have been ushered in with fever, it closely resembles, and indeed is intimately allied to, both in its symptoms and pathology, the CHOLERIC FEVER of infants. (See that article.) The greater severity of the attack, the presence of fever, and the more frequent vomiting and purging, are the chief symptoms which characterise this latter malady, and distinguish it from that now under consideration. The diarrhœa, the unoppressed state of the cerebral functions, the extreme irritability, fretfulness and restlessness, and the cerebral symptoms generally, fully distinguish this disease from inflammation of the brain or of its membranes, and from acute hydrocephalus.

135. iii. *Causes.* The *predisposing causes* are chiefly a weak or delicate development of the constitution, originally deficient vital energy, a poor or unhealthy state of the nurse's milk, and the numerous other causes lowering the powers of life in early infancy. The more common *exciting causes* are principally unwholesome, inappropriate, or insufficient food; weaning, or bringing up by hand, or premature weaning; and living in low, damp, or miasmatous localities, or in close, ill-ventilated, crowded apartments or cellars, or in

warm, damp, and low districts. I have seen this disease prevalent in low, humid, and miasmatous places, in warm countries, and within the tropics, particularly amongst the children of European parents. Many of the diseases of the infants or children of white parents residing in these countries, are more or less intimately related to this malady, especially whilst they continue to reside in them. M. Cruveilhier observed it to assume an epidemic form in some districts of France; and, when thus appearing, as well as when occurring sporadically, it is often *complicated* with softening of the villous coat of the stomach. When it proceeds from the state, quantity, or kind of food or other ingesta, it is generally thus associated; but, when it arises from the climate, air, and locality, it is frequently uncomplicated.

136. iv. *The structural change*, constituting this malady, is fully described in the article Digestive Canal (§ 34.). Dr. Droste considers that the softening process may be divided into *three stages:* — in the *first*, the villous surface preserves its appearance and texture, but loses its natural consistence, either in parts or patches, or more or less extensively. In the *second* stage, the villous membrane is converted into a thin, soft, gelatinous, and nearly transparent substance, which may be wiped off by a sponge from the adjoining tissue, or even washed off by a stream of water poured upon it; yet it seems still to be continuous with, or adherent to, the subjacent coats, which are also much softened. In the *third* stage, no trace of organization is left in any of the coats; the intestines being either perforated in various places, to a greater or less extent, or showing such perforations on being washed by a sponge or stream of water. It is obvious, that these stages are merely arbitrary divisions of the progressive advance of disorganization. As this malady consists of a loss of the vital cohesion of the coats of the intestines, it will obviously follow, that the capillary circulation will indicate, in these situations, some degree of congestion, or sanguineous exudations, in the form of ecchymoses and spots of extravasated blood. Softening may take place in any part of the alimentary canal. I have observed it most frequently in the stomach and ileum, and, as respects the latter, in the lower portion of it.

137. v. The *nature* of this change has been discussed by several continental pathologists, — and chiefly by Cruveilhier, Camerer, Andral, Droste, and Pommer; all of whom admit that softening of the intestinal villous membrane may be an idiopathic change, and independent of inflammation. Camerer, however, supposes that it proceeds from inflammation of the nerves supplying the intestinal canal, terminating in paralysis of them. From the history and phenomena of several cases which I have observed, as well as from the appearances after death, I believe that the softening here described depends upon innervation, or insufficient power, of the intestinal nerves, in consequence of which condition the villous surface first, and the other coats consecutively, lose their vital cohesion. This view is confirmed, moreover, by the effects of the remedies employed in cases manifesting the usual symptoms of the disease.

138. vi. *Treatment.*—The *causes* and *circumstances* connected with the production of the complaint should be ascertained and removed. The health of the nurse, and the state of her milk, ought to receive attention. If the infant be weaned, the diet must be duly regulated as to quantity and quality. Thirst, which is a general feature of the disease, should be allayed by frequent sippings, and never by full draughts. Asses' milk or milk and water or lime-water may be given often, but in small quantity; and if any additional food be allowed, it should be suited to the reduced state of digestive and assimilative power, and to the age of the patient. The medicines most appropriate to the disease are the preparations of *iron* and of *lime* and the more permanent and astringent vegetable *tonics.* Of the former, the *sulphate* and *muriate of iron* are the most serviceable, and of the latter the powdered *Cascarilla bark.* At the Infirmary for the Diseases of Children, I usually gave this bark with either of these salts in the form of powder, and very generally with the best results, when the patient came under the treatment in any of the earlier periods of the disease. This practice has been adopted in this Institution since my earliest connection with it (in 1820); and a similar treatment has been found successful in Germany by Drs. Pommer and Droste. In addition to these means, I have frequently prescribed warm salt-water bathing, and assiduous frictions, with stimulating liniments along the spine; and I have occasionally employed the *iodide of potassium* with advantage. An improvement in the pulse and other symptoms has often been observed on the second and third day after this course of treatment has been adopted. In this complaint, as in all others depending upon vital depression, particularly when occurring in large towns, and in other unhealthy localities, *change of air*, particularly to the sea-side, is a most important part of treatment; and, when aided by suitable diet and regimen, and by appropriate medicines, will generally remove the disease, if actual disorganization have not taken place.

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INTUS-SUSCEPTION. — *See* art. Colic and Ileus, § 38.

IRITIS. — *See* art. Eye.

IRRITABILITY.

— Synon. *Irritabilitas; vis irritabilitatis; vis insita*, Haller. *Vis vitalis*, Görter. *Irritabilité*, Fr. *Die irritabilität, Reizbarkeit*, Germ. *Inherent power, Myotility, Muscular Power, Contractility, Muscular Contractility, Excitability*, &c. of various authors.

Classif. — General Pathology.

1. Defin. — *A power or property of organized bodies of being acted upon by stimuli, so as to give rise to movements, manifested chiefly by muscular or fibrous tissues.*

2. This very important and generally diffused property of animal bodies was first investigated by Dr. Glisson. He applied the term "*irritability*" to all *the sensible and insensible movements of animals.* Baglivi, Görter, Winter, and Hoffmann used this term in nearly a similar manner to Glisson, and it was thus commonly employed until Haller restricted it to *the susceptibility of movement in muscular tissues*, and carefully investigated its laws in those parts. In this latter sense it was employed by physiologists, until Girtanner rejected the restricted sense of Haller, and used it in the comprehensive sense adopted by Glisson.

3. i. *Of the Source of Irritability.* — The source of this property soon became a subject of discussion. Most physicians recognised it as a manifestation of life in organised bodies; but the circumstance of its being called into activity by nervous influence readily suggested the question as to its dependence upon, or independence of, this influence. Haller and his disciples, with Fontana, Metzger, Bichat and others, considered irritability to be, *sui generis*, inherent in the muscular fibre, altogether independent of nervous influence, and only subjected, in muscles governed by the will, to the action of the nerves, which in this case serve as conductors of the stimulus intended to excite contraction. They founded their opinion on the facts, that muscular power is altogether different from the power of living nerves in its manifestations, the former consisting of visible oscillations and movements not perceivable in nerves, — and that destruction of the brain and spinal chord, or division of the voluntary nerves supplying the muscles, does not annihilate the power of muscular movement, when subjected to irritation. On the other hand, Whytt, Monro, Unzer, Prochaska, Legallois, &c. regarded the nervous power as the principle upon which all muscular contractions depend, and consequently irritability to be communicated to the muscles by the nerves, — because nerves enter into the composition of all muscles; because the latter contract quite as well when the former are irritated, as when the stimulus is applied to the muscles themselves; because irritability is extinguished by substances subversive of nervous power; and because the destruction of the brain and spinal chord, and section or ligature of the nerves, cause the disappearance of the power of contraction on applying irritants to the muscles. It is obvious, as Tiedemann has remarked, that both parties have pushed their arguments too far, and, indeed, have over-stated or exaggerated the facts from which they argue. Haller and his disciples were wrong, and went counter to every idea of an organised body, in which all the manifestations of life are mutually connected, in attributing to the muscles a faculty altogether independent of the influence of the nervous system. But his opponents were equally wrong in attaching too great an importance to the part which the cerebro-spinal nervous system performs in the phenomena of muscular contractility.

4. In the year 1820, and subsequently (see *Lond. Med. Repository, for May,* 1822, *and my Notes and Appendix to Richerand's Elements of Physiology, &c.* edit. 1824, 2d edit. 1829, p. 690.), I showed, as the result of my researches into this subject, that irritability is not dependent upon the cerebro-spinal nervous system, although it is ex-

cited by this system; but that it proceeds from the organic or ganglial system of nerves* — that this latter system bestows on muscular or fibrous tissues the power of contraction, whilst the spinal nerves simply conduct or convey the stimuli to contraction. This statement, with the proofs and arguments in its favour, appeared at the time just stated; and in 1835 — fifteen years subsequently — Dr. FLETCHER published lectures (*in Lond. Med. and Surg. Journ.*, vol. vii. p. 327. *et seq.*), in which not only the same statement, but also the identical proofs and arguments, which had been urged by me in the works above referred to, were adduced by him as his own original views, and in some parts in nearly the same words as I had there employed. In the republication, however, of these lectures, and in a different form, some reference was made to the originator of these views, but in such a manner as showed that the act was one of compulsion rather than of inclination.

5. As expressed in my published notes on this subject, and on others connected with it, I have suggested that the different departments of the nervous system have been hitherto viewed in a much too restricted manner; and that, instead of considering the different orders of nerves as ramifications shooting forth from the large nervous masses, it would be equally, if not more, correct, and consistent with the gradual rise in the scale of animal creation, and with the development of the tissues and organs in the higher animals, to view them as originating in the different structures and organs in which they have hitherto been said to terminate.† The reasons which I assigned for this mode of investigation, and for adopting it in addition to the one-sided mode of viewing this subject hitherto pursued, need not be here repeated. I may, however, briefly state, that the lowest grades of animal bodies, and the earliest stage of animal formation, display merely minute granulated or nucleated globules or corpuscles, more or less abundantly disseminated throughout the cellular and other tissues; and that, as these tissues are more visibly developed, and assume a more truly cellular and fibrous conformation, from the almost albuminous state of the earlier stage of their formation, so the grey fibres constituting the organic nervous ramifications become visible in connection with these corpuscles. In the fully developed state of animal organisation these granulated corpuscles are numerous and demonstrable in the tissues, parti-

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* As respects the more perfect manifestations of this property, by means of muscular structures, I there stated, "that, as irritability is present in parts which do not receive voluntary nerves, this faculty cannot be attributed to them. To what other species of organisation can we refer it? We observe it, in the more perfect animals, displayed chiefly by muscular parts. Is it from this circumstance an attribute only of muscular parts, and the pure result of their conformation? One class of physiologists answers this question in the affirmative. But irritability is manifested in the lowest orders of the animal creation, as well as in some of the higher, by parts in which a muscular structure cannot be detected; therefore, although a property of the muscular structure, it is neither altogether restricted to it, nor is it strictly the result of the organisation of this structure, independently of some other. Consequently this property must be referred to a conformation still more general than the muscular tissue, as respects both the entire scale of animal creation, and the organisation of individual species; allowing, at the same time, that a particular structure is requisite to the full and perfect manifestation of this property, but that this structure depends upon a different source than itself for the property which it displays.

"Having arrived at the conclusion, that irritability, although a property of muscular parts, is not the result of muscular organisation merely, but is derived from a different and more general system, supplying the muscular structure as well as other structures, we must next inquire what this system is. It has been already shown that the organic or ganglial nervous system is distributed in various proportions to all the textures and organs of the body; that this system is similarly distributed throughout all the individuals composing the animal kingdom; that in some animals it is the chief nervous system; that not only is it present wherever irritability is manifested, but it is the most generally diffused of all the tissues; that no other structure than this exists which can be shown to be present in every species of irritable or contractile parts, in all orders of animals; and, consequently, that to no other source than this can irritability be assigned.

"Having inferred that the muscular fibre is only the instrument of contraction in its more perfect condition, — that it performs the function in consequence of a certain conformation, and owing to that conformation being endowed by another still more generally diffused than itself, — and that this property is derived from the ganglial, or soft nervous system, — we are led further to infer that the cerebro-spinal nerves are distributed to muscular parts for specific purposes, but that these parts do not derive their innate properties from these latter nerves — these nerves merely exciting them, or acting as conductors of a stimulus to properties which proceed from a different source. I have contended that these properties are not innate, or the consequence of the conformation of the muscular fibre itself; but are derived from a conformation more general, surrounding or otherwise connected with the muscular fibriles, and that this more general conformation is the organic nervous system. Conceiving, therefore, that this system, in its state of ultimate distribution and dissemination in the texture of a muscle, whether in the form of unarranged corpuscles, or of minute and variously arranged fibriles resulting from the regular distribution of these corpuscles, is the chief source of the property evinced by muscular parts of every denomination, I further conclude that the cerebro-spinal nerves do not produce their specific effects on muscular fibres, owing to a nervous fibrile being ramified to each muscular fibrile, for this does not take place; nor do these effects proceed from the direct influence of these nerves upon the muscular fibrile, for the muscular fibre has been shown to derive its property or faculty of contraction from a source different from itself and from the voluntary nerves which occasionally excite its contractions; but that these nerves seem to act directly upon the ultimate distribution or corpuscles of the organic nervous system in the muscle, which system bestows on it the faculty of, or disposition to, active contraction, on the application of a stimulus; and this faculty all muscular parts possess, although some of these parts only are supplied with voluntary nerves, and are liable to be acted upon by cerebro-spinal influence. The mode of termination of voluntary nerves in muscular parts also favours the opinion now stated. These nerves terminate, as already noticed, in such a manner as leads me to infer, that they become, in the textures which they supply, gradually identified, as it were, or amalgamated, with the ultimate distributions of the ganglial nerves; and the history of the embryo and the progressive development of the nervous system in the lower animals lead me to believe that the voluntary nerves originate in the textures which they supply; that they proceed from the ganglial system; and that their larger branches, the spinal marrow, and encephalon are successively formed."

† "Viewing the nervous system throughout the numerous classes of animals, and tracing the process of its formation from the embryo up to the period of perfect fœtal existence in the higher animals, I am led to infer that this system is not originally formed from the centre towards the circumference, but that the origin of its ramifications commences in the mucous or cellular tissues, when the embryo is yet but in an apparently homogeneous state; and that as the textures become, in the process of fœtal growth, more and more developed, so the corpuscles composing the rudimental nervous system, and chiefly those of the ganglial system of nerves, are arranged into chords of communication, chiefly in the course of the vessels, for the purpose of preserving a connection between the organs, and reinforcing each of the textures with the influence which those systems generate in their perfect states of development. As the embryo is formed, the nervous ramifications advance towards centres, which vary in their characters according to the genus of the animal: in those which are more perfect those centres are numerous, and almost each differs more or less sensibly from the other, both as to appearance and function." — See *Author's Notes, &c. to* M. RICHERAND'S *Elements of Physiology*, &c., p. 1.

cularly in the ganglions in connection with the grey organic fibres, and in the muscular fibriles, both involuntary and voluntary. But, whether these corpuscles are formed before the large nervous masses connected with sensation, volition, &c. or contemporaneously with these masses, is of little consequence. The most important question is — What is the function performed by these corpuscles? When we recollect that these bodies are found disseminated through the albuminous and otherwise almost inorganised structure of polypi, and throughout the tissues of others of the lowest animals, which manifest irritability as their most important function, and when we know that these animals are capable of being multiplied by division, and that parts cut off from them have separate existences, it seems highly probable that the vital functions they display — that irritability proceeds from this peculiar organisation. Having further observed these granulated corpuscles disseminated through other tissues, in an abundance proportionate to the amount or grade of vital function — having detected these corpuscles in great numbers within the delicate membrane investing the primitive fasciculi of voluntary muscular fibriles, and in the flattened fibriles of involuntary muscular parts, — having seen still greater numbers of them comprised in the structure of the organic nervous fibres, and constituting the chief part of the ganglia, — and having moreover found them giving origin to the grey and solid filaments of organic nerves, as well as comprised in or embraced by these filaments, it may be inferred that they are mainly concerned in the production of the various grades of irritability or contractility manifested by the tissues in which they* are thus disseminated, and to which they are thus supplied.

6. The views which I published in 1820, 1824 and 1829, respecting the constitution, connections, and functions of the organic or ganglial nervous system, have been more recently (from 1831 till 1840) confirmed by the researches of RETZIUS, GILTAY, MÜLLER, and VALENTIN. The organic, or grey nerves, do not consist, as the motor and sensitive nerves of the spino-cerebral axis do, of parallel tubes containing a liquid matter; but are altogether homogeneous, pale, almost transparent, and peculiar in their form, distribution, and connections. They are intimately connected with the granulated or nucleated corpuscles disseminated throughout the tissues, and they either enclose, or are otherwise associated with, these corpuscles or globules in great numbers, both in the ganglia and in the plexuses and ramifications. The grey, or ganglial nerves, thus seem to arise from the organic globules just described, especially from those contained in the ganglia. The ganglia should therefore be regarded as the central organs of the organic nervous system; and the white fibres which run to and through them, especially in the lateral chords of sympathetic ganglia, without having any intimate connection with the granulated corpuscles of the ganglia, and merely passing between these corpuscles, are the sensitive and motor fibres of the nerves derived from the cerebrum and spinal chord. The organic, or grey portions of the nervous system, and more especially of those parts of it lodged in the abdominal, thoracic, and cervical regions, preside over the organic and truly vital functions; and their connections with the cerebro-spinal centres are such as evidently show that they are ramified thither in order to endow these centres with the organic nervous power in common with other parts of the œconomy; nerves proceeding from these centres also being ramified to the ganglia to supply them with the sensitive and motor influences. The nervous connections or ramifications between the ganglia and cerebro-spinal axis thus consist of the solid or homogeneous grey fibres of organic nerves conveying the strictly vital or vegetative influence to the brain and spinal chord, and of the whitish tubular fibres of motor and sensitive nerves transmitting the influence of these organs in various degrees to the viscera engaged in the strictly vital operations. In those parts which perform complex functions, as the organs constituting the face, mouth, throat, &c., and the organs of generation, which are endowed with the functions of secretion, sensation, and motion, the nerves proceeding thither consist both of the grey fibres of organic life, and the white tubular fibres of sensitive and motor nerves.

7. From what has been here stated,—from the most recent researches,—and from the conformation detected by microscopic observation, the results of my own investigations many years since, as published in the works already referred to, have been fully confirmed, namely, that the organic or ganglial nervous system presides over the strictly vital functions, and that all the grades and manifestations of irritability or contractility proceed from this source. It is extremely probable that the organic or nucleated corpuscles disseminated throughout the structures, and particularly in fibrous and contractile parts, bestow a certain share or grade of contractility upon them, and that an additional or even a principal share of this property is contributed by the ganglia and organic nerves distributed to them. Indeed this is shown by numerous observations made by me in 1812 and 1813, when it was proved that the hearts of fishes continued to contract for a considerable time after they were removed from the animals, and from all the nervous structures external to themselves; whilst influence of the ganglia on the involuntary muscles was proved by the application of powerful stimuli to the cœliac ganglion having caused increased peristaltic movements of the intestines that continued for some time. (See a notice of these experiments in my "*Notes*," &c., already referred to.)

8. In the organic muscles, which possess either a power of almost continued action, or a certain rhythm of action, as the heart and alimentary canal, the organic nerves are plentifully distributed, and abound with the organic corpuscles above described; showing that the unexhausted irritability of these parts is chiefly owing to this organisation. The facts and arguments adduced so many years since by me, in proof of the dependence of irritability upon the organic nervous system, have been very recently urged with little variation by DR. FLETCHER and by several German

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* SCHWANN and more recent microscopic observers and physiological writers, both foreign and British, suppose that these granulated corpuscles are merely the nuclei of the cells from which, according to him, all the tissues are developed. That this, however, is not the case, and that these corpuscles are intimately connected with the performance of important functions, are shown by their higher and more complex organisation, and by the circumstances of their constituting the principl part of the composition of the ganglia and of the organic nerves. I would therefore denominate them the *organic corpuscles*.

writers; but what they have advanced merely confirms what I had published, fully explained, and made even the basis of a system of general and special pathology, many years previously, in the works above stated. Amongst others, the subjoined remarks* of MUELLER, from the able translation of his Elements of Physiology, by Dr. BALY, may be adduced in illustration of what I had stated long since respecting the functions of the organic or ganglial nervous system, and the source of irritability. After stating the same facts as have been advanced by me, he draws the same inference, namely, "that the organic nerves distributed in the muscular substance have a principal share in the production of their automatic movements, and that the rhythmic contractions of the organic muscles are not independent of the nerves, as HALLER believed." (P. 913.) — The error of those who contended that irritability was independent of nervous influence, arose from the circumstance of their confounding the cerebro-spinal nervous influence, or sensitive and motive function, with organic nervous power, or the strictly vital manifestations. HALLER, believing that there was only one species of nervous influence, and that it proceeded from the brain, considered the irritability of muscular parts to be what it really is, independent of this part of the nervous system; but his arguments and facts left entirely unaffected, or rather confirmed, the view, first advanced and supported by me, that this property of animal bodies proceeds from the organic nervous system, which system I showed to be altogether distinct from the cerebro-spinal nervous system, its functions being different from those of the other system, and altogether of a strictly vital character.†

9. From what has been now stated, it will be inferred that *irritability*, according to the sense in which it has been viewed by HALLER and others, is the contractility, or power of contraction, possessed by muscular parts, and displayed by them when acted upon by stimuli or irritants. In the wider sense of the word, according to GLISSON and others, it is the power of sensible and insensible contraction possessed by most living tissues. The molecules of matter composing the living structures are preserved in a state of cohesion, varying in grade in the different tissues. This variation in grade depends upon the organization of the tissue, and upon the state of its vital endowment. That the organization affects the cohesion of a particular structure, does not require proof; and that the state of vitality exerts a marked influence upon the cohesion of the tissues generally, is shown by the gradual loss of cohesion as vitality departs, and as it becomes reduced in the progress of diseases characterised by exhaustion. The state of the blood also affects the cohesion of the structures, but most probably by first reducing vital power. From this intimate dependence of structural cohesion upon vitality, the term *vital cohesion* of the tissues may be used with reference to some of the most important conditions presented by them in health and in disease. As the powers of life are perfect and strongly manifested, so cohesion is perfect, and, as these powers are reduced, so it also is reduced: hence it becomes an index in many diseases of the degree to which this reduction has taken place; the firmness and tenacity of the tissues, and the duration of these properties for a time after death, varying with the reduction of vital energy.

10. ii. *Of the Grades of Irritability.* — The *vital cohesion* of the tissues is one of the earliest, the most generally diffused, the lowest, and the most persistent of vital phenomena. It furnishes as it were, the basis for all the other manifestations of life; and as it becomes weakened, or ceases, these manifestations more or less completely disappear. As long as the tissues are endowed with life, vital cohesion continues, varying however in grade with the circumstances just stated. Of the parts possessed of vital cohesion, a very large proportion present certain grades and modes of *contractility* which have been variously denominated. Contractility is essentially a vital phenomenon, and results from changes in the vital endowment of a structure affecting the relative position of the molecules composing such structure. *Vital contractility* may be divided into grades, commencing with the lowest and the most generally diffused grade of this property of living parts — with that grade the next above simple vital cohesion, in the scale of animal manifestations.

11. 1st. *Insensible organic contractility*, or that state usually denominated *tone or tonicity*, is, like *vital cohesion*, not confined to the animal kingdom: it is a property of vegetables and of animals not possessed of a heart. It is diffused throughout the tissues, and may be viewed as merely a higher grade of *vital cohesion*, or rather this latter may be considered as the lowest manifestation of life in organic structures, insensible organic contractility or tone being the next in the scale. This property, equally with the preceding, results from the vital influence with which the structures are endowed, — is perfect, as this influence is perfect, is impaired as it is weakened, and altogether disappears soon after life has departed. Insensible contractility or tone is manifested by the vascular system more especially, and by the soft solids generally; and it is more or less exerted in all the vital operations — in the circulation, in secretion, in nutrition, and

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* "It has been proved that the automatic movements of the organic muscles, like all muscular motion, depend primarily on the influence of the nervous principle; that the cause of the rhythm of these automatic motions is not connected with the nature of the muscular fibres, but with the peculiarity of the nervous system of the organic muscles: and that the cœliac ganglion has the property of exciting, when irritated, the peristaltic motions of the intestines. It appears, moreover, that the sympathetic nerve retains its ganglionic structure even in its more minute ramifications; and the power of the intestine to perform its peristaltic motions is found to be preserved even when it is separated from the mesentery. From these facts, then, I conclude, that even the minute branches of the sympathetic which ramify in the intestinal coats, have the same power of causing periodic contractions as the cœliac ganglion was proved to possess. The explanation which applies to the peristaltic movements of the intestines has the same force with relation to the rhythmic motion of the heart, the first observed motion of which, in its simple tubular condition, is indeed of a peristaltic nature. Since, therefore, not merely the larger ganglions of the sympathetic, but even its ultimate ramifications in the tissues of organs seem to possess the power of giving rise to periodic motions, we can understand how the rhythmic movements of the heart, intestine, and oviduct of the turtle, are enabled to continue when these organs are removed from their connections in the body." — *Mueller's Physiology*, by *Baly*, p. 914.

† On this subject the reader is referred to the *London Medical Repository*, vol. xvii. p. 370. *et seq.*: and to the Author's Notes and Appendix to M. RICHERAND'S *Elements of Physiology*, where will be found the same facts and opinions stated as early as 1820, 1822, and 1824, as have been espoused by MÜLLER, and others much more recently.

in absorption; the perfection of these functions depending upon its due manifestation. The organic nervous system seems to be instrumental in its production and preservation in the animal kingdom, as I have contended in the works already referred to.

12. 2dly. *Sensible organic contractility, or irritability*, is that property of contraction which exists in fibrous and muscular parts. It is excited by the application of an irritant or stimulant; and depends, as I have shown above (§4. *et seq.*), upon the ultimate organization and distribution of the organic or ganglial nervous substance or corpuscles to these parts.

13. Both these species of organic contractility result from one species of influence with which animal bodies are endowed — they are the proximate results of vitality, and differ from each other, owing to the intimate structure of the parts in which they are seated, and to the extent to which each of the parts manifesting these properties is supplied with the organic nervous globules and ganglial ramifications.

14. 3dly. *Cerebro-spinal Contractility* is the contraction of those muscles which is occasioned by volition, and by stimulants acting upon their motive and sensitive nerves. It takes place only in such muscles as receive nerves from the spinal chord, medulla oblongata, and encephalon; and results from this conformation and connection with these centres of volition and sensation. Although produced and directed by volition, it may also be excited by irritations acting upon, or conveyed to, the cerebro-spinal axis, or the nerves proceeding from any part of this axis.

15. The *first* and *second species* of contractility proceed from the organic nervous system and influence, the *third* from the super-addition of the nerves of voluntary motion and of sensation. This last form of contractility, however, may take place in voluntary muscles, independently of *volition*, by a "*reflex sympathy*," as shown by me in the places already referred to[*]: and independently also of *sensation*, as subsequently contended for by Dr. M. Hall, by means of what he has denominated a "*reflex function*" with which he supposes the spinal chord to be endowed.

16. As the various grades of contractility are dependent upon vital energy, and as the higher grades of it are influenced moreover by the states of the nervous systems — sensible organic contractility, by the organic nervous system; and cerebro-spinal contractility by the cerebro-spinal system — so it must necessarily follow, that they will vary in their grades and conditions with the vital manifestations generally, and with those more particularly evinced by these systems. Hence irritability may be impaired or exalted, either throughout the frame, or in one or more tissues or parts. Irritable structures, moreover, are not only liable to alterations in the grades of action, but they also evince a greater or less disposition to be acted upon by the ordinary stimuli. The susceptibility of irritation as well as the degrees to which the consequent contraction takes place in living structures, vary in different constitutions and temperaments, and in different diseases, and even in the same disease, owing to various circumstances connected with diathesis and habit of body, and with the nature of the exciting causes.

17. iii. *Conditions requisite to the healthy manifestation of the several grades of irritability.* From what has been stated, it is obvious that these manifestations will be perfect according as the vital endowment is perfect. That form of contractility, with which the involuntary muscles are endowed, being altogether dependent upon the ganglial nervous system, will necessarily be influenced by the conditions of this system; and that which is displayed by voluntary muscles will vary, according to the states of the cerebro-spinal axis and nerves, chiefly in respect of the degree in which these muscles will still continue subjected to the influence of volition; injury or destruction of these parts of the nervous system leaving the voluntary muscles still possessed of their contractility, although in a more or less impaired form, owing to the loss of an accustomed stimulus to contraction; and as I have stated many years ago in my physiological notes, it is reasonable to suppose, "that the voluntary nerves convey to the organic or vital nerves a natural stimulus or influence; and that, if the latter nerves were deprived of this additional influence, the parts supplied with them would necessarily suffer an impairment of function."

18. *A.* A strong proof *of the influence of the nervous systems upon irritability* is furnished by the operation of these agents, which either exhaust, or directly depress, the nervous power. Galvanism, electricity, mechanical irritation, &c., exhaust this property, and narcotics destroy it, or at least greatly impair it. These effects are produced upon both voluntary and involuntary muscles, and whether the agents be applied to the muscular tissue directly, or to the nerves distributed to them. In the former case, they affect chiefly the organic corpuscles or vital nerves actuating the muscular structure; in the latter, they produce a nearly similar effect through the medium of the voluntary nerves terminating in it. Many of the exciting causes of disease, and the majority of our medicinal agents, produce these effects in a similar manner; the several manifestations of contractility being thereby impaired, exalted, or exhausted, or specifically modified, according to the natures or properties of such causes and agents. From what has been stated, as well as from obvious phenomena coming under the cognizance of every observer, it may be inferred, that the several grades of irritability of this property, viewed in the sense entertained by Glisson, are the most general and important of the several endowments of life, and the most requisite to the continuance of life. I have also stated, and more fully attempted to show many years since, that this property results from a peculiar organization — from the distribution of the organic or vital nervous fibriles and corpuscles to the tissues displaying this property: and that the apparent dependence of it, in voluntary muscles, upon the

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[*] See also several *articles* in the first volume of this work, which were published twelve months before the appearance of Dr. M. Hall's views. In these articles (p. 322. § 23., p. 331. § 16., p. 424. § 46., and p. 576. § 81.) I have accounted for the occurrence of involuntary movements, contractions, and spasms in voluntary muscles, in several diseases, by showing that they proceed from irritation propagated to the roots of the spinal nerves, or to the spinal chord itself, and thence reflected, by means of the spinal nerves, upon the voluntary muscles. (See articles Cholera, Chorea, &c., Convulsions, Disease, Epilepsy, and Irritation, at the *sections* just referred to.)

cerebro-spinal nervous system, is owing to the termination of motor nerves in these muscles, in order to bring them under the influence of volition; the high grade of irritability which they possess being, however, derived from the organic or vital nervous system; and probably, also, reinforced by the influence proceeding from the spinal chord.*

19. It follows from the foregoing, that whilst the several manifestations of irritability are all directly dependent upon the organic or vital nervous system, — are expressions of life through the medium of this system, — one form only of this property, namely, voluntary motion, is unequivocally influenced by the cerebro-spinal nervous system; this form, however, being chiefly derived from the former source, although excited and directed by the latter. Moreover, it may be inferred that these manifestations being dependent upon this source, the several changes to which they are subject chiefly proceed from changes in the condition of the organic or vital nervous energy; and that alterations of that form of this property which is more intimately connected with volition, equally with the other forms, also proceed from the same source; a healthy state of the cerebro-spinal nervous system, and of its ramifications, being requisite to the due excitement, direction, and determination, of this particular manifestation of irritability. These influences, indeed, are daily illustrated by the phenomena of disease, more particularly of those diseases which implicate the vital endowments manifested through the medium of the ganglial or vital nervous system, or which affect the integrity of the cerebro-spinal system. In the former class of these diseases, the irritability of vital organs is affected co-ordinately with the disorder experienced by the ganglial system; and that of voluntary organs is also either imperfectly manifested, or incapable of being determined or directed. In the latter class, on the other hand, the organic nervous system is entirely unaffected, its functions being quite healthy, and irritability also perfect throughout the frame; yet, owing to lesion in some part of the cerebro-spinal system, the contractions of voluntary muscles are either not excited, or not directed, or uncontrolled, although the power derived from the ganglial system still continues to be possessed by them.

20. *B.* The *influence of the blood upon the irritability of parts* is demonstrable. Stenson, Arnemann, Bichat, Emmert, Segalas, and others have proved this influence; and shown, that the presence of blood in irritable textures is necessary to the continuance, even for a short time, of the property of contraction; and that the power of volition over voluntary muscles is lost when blood is no longer sent to them. It is also fully proved, that arterial blood is requisite to the due performance of the several grades of contractility; and that, whilst the continued action of this blood on irritable parts is necessary to their functions, this blood loses something by this action, or undergoes changes in the course of it, that give this fluid the venous character. That venous blood is incapable of supporting irritability in its healthy and more persistent states, is shown by the blue disease, and by the several modes of producing asphyxia. The state of the blood, in respect also of the presence in it of either stimulating, depressing, narcotic or specifically alterative, materials, has also a most important effect upon the several forms of irritability. Many of the causes of disease, many remedies, and many poisons, act upon the frame by passing into the circulation, and affecting, by their presence in the blood, the different grades of this property, their influence being exerted in this way, either upon the organic and cerebro-spinal nervous systems, and through them upon the irritable structures, or upon these structures directly, or even upon these systems and structures conjointly and coetaneously. The changes also which take place in the blood, in the course of diseases, particularly contaminating maladies and fevers, owing either to the absorption of morbid matters into the circulation, or to interrupted elimination of effœte and injurious materials from it, affect the several forms of irritability, and even the vital cohesion of the tissues, in the manner now explained; the absorption or accumulation, however, of these excrementitious matters, generally having a similar effect to that produced on the frame by animal poisons. Contractility is affected by the various stimuli or irritants, which may act either directly on irritable or contractile parts, or on nerves supplying them, or on the central nervous organs; but remarks on this part of the subject, as well as on the varying susceptibility of irritation, in different persons and diseases, will find a more appropriate place in the article Irritation.

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* "It appears, from the effects of agents upon voluntary or other muscular parts, when directly applied to the ganglial or vital nerves, — from the intimate organization of contractile parts, — from the distribution of these nerves to the vascular system, to the extreme capillaries, and to voluntary as well as to involuntary muscles, — that the ganglial or vital nervous system gives rise, in both these kinds of muscles, to the phenomenon called irritability; the different manifestations of this property, as it is displayed in voluntary and involuntary muscles, resulting from the accessary supply of the spinal nerves which the former muscles receive. (*Notes*, &c., 1824.)

ology, &c. trans. by *W. D. How*, 8vo. Lond. 1825, p. 207. — *M. Hall*, Phil. Trans. 1833. — *F. Tiedemann*, Systematic Treatise on Comparat. Physiol. &c. trans. by *J. M. Gully* and *J. H. Lane*, &c. 8vo. Lond. 1834, p. 289. — *J. Müller*, Elements of Physiology, trans. by *W. Baly*, 8vo. Lond. 1840, vol. i. *passim.*—(*A. Walker*), Documents and Dates of Modern Discoveries in the Nervous System, 8vo. Lond. 1839, p. 155.—(*See also the numerous recent works on Physiology.*)

IRRITATION. — Syn. *Οργασμος, ερεθισμος*, Gr. *Irritatio, Irritamentum*, Lat. *Reizung*, Germ. *Irritazione*, Ital.

Classif. — General Pathology — Special Pathology and Therapeutics.

1. Defin. *An exaltation of the vital actions of a particular tissue or system, relatively to the vital states of other parts.*

2. I. Preliminary Remarks. — Next to *Inflammation* the morbid condition to which the term *Irritation* has been applied, is the most important both to the pathologist and to the rational practitioner. Notwithstanding this, the term has been vaguely employed; and the existence of the morbid states, which it has been used to designate, has been as loosely inferred. This has arisen, in a great measure, from the neglect of these states, until a comparatively recent period, by most writers on general and special pathology; from the want of any precise ideas respecting the nature, extent, and relations of the morbid actions, to which the term irritation is applicable; and from the difficulty of determining the modes, grades, transitions, and consequences, which these actions experience. The varying characters, also, of irritation with the tissue or part primarily or chiefly affected, and with lesions of adjoining or of functionally associated parts, and the superinduction of other morbid changes, more particularly of increased exhalation, secretion, and inflammatory action, have given rise to much perplexity, in respect not only of the meaning attached to the word, but also of attempts of ascertaining its existence, seat, and extent. Hitherto irritation, as a primary morbid condition, has been inferred more frequently from the absence during disease of more manifest alterations, than from any positive proof of its presence; and to it have been referred by many, those disorders and maladies which could not be imputed to any more palpable lesion.

3. It has been shown, in the article Irritability: — 1st. That irritability is the chief manifestation or expression of life in the tissues and organs of a living body; — 2d. That it exists in various grades and modes according to the organization and connections of different textures and systems, the functions of organs being discharged in great measure by such agencies; — 3d. That the modes and grades of this property ascend from simple vital cohesion up to that form of muscular contractility which is determined and regulated by the will[*]; — 4th. That in this, its highest grade, it interests and is associated with conscious sensibility[†]; — 5th. That it is variously affected by the states and changes of the nervous system more particularly by the organic or vital nervous system, and by the conditions of the blood; — 6th. And that such affections constitute the principal alterations in numerous constitutional maladies.

4. To these fundamental principles of pathology, which were fully developed by me many years ago (*Lond. Med. Repository*, vol. xvii.), others may be added having a stricter reference to the subject now under consideration. The grades and modes of irritability thus vary not only in different organs or parts, but also in different epochs of life, in different temperaments and habits of body, and under the influence of numerous physical agents and various moral influences. Depending as it does upon the amount or condition of vitality, so it must necessarily vary with the states of this actuating and controlling principle. Where this principle is powerfully or largely imparted, irritability will also be energetically evinced, and long exerted; but where life is depressed, exhausted, or feeble from the earliest endowment of it in the structures, then irritability will be feebly expressed, readily excited in its highest grades, and speedily dissipated. With weakness or vital depression, irritability becomes more easily roused — the susceptibility increased — or, in other words, the disposition to contract upon the application of irritants is greater; but the contractions are weaker and the sooner cease altogether. Yet this increased susceptibility of parts thus weakly endowed is not general, and exists chiefly in parts which manifest the higher grades of irritability.

5. Another important circumstance which may be noticed is the increased disposition of local irritation to extend itself in proportion to the increase of susceptibility, or, in other words, to the diminution of vital power. This augmented disposition to the extension of irritation, and to the manifestation of several of its effects in different and remote parts, evidently depends upon the same primary condition, to which I have attributed increased susceptibility; namely, weakened organic nervous energy or vital power. Hence an increased disposition to be affected by irritants generally, is associated also with a disposition to extend their effects to distant parts. The extension of irritation, or rather of its effects, far beyond its primary seat evidently depends upon, or rather takes place through the medium of the organic or vital and the cerebro-spinal nervous systems, the former especially: but this topic will be more fully considered hereafter.

6. Illustrations of the foregoing pathological facts are daily presented in practice. We continually observe in persons originally and organically feeble, in those who have become feeble from the exhaustion consequent upon excessive or repeated excitement, and in those depressed by disease, all contractile parts, more particularly muscular structures, to be readily acted on by irritants, especially by such as are novel; but the excited action is weak, or is soon exhausted, and rapidly sinks the principle upon which the contractility depends. In connection also with this local susceptibility, an increased disposition to experience the effects of the local and primary irritation in distant parts, is also developed; and these distant parts often manifest the prin-

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[*] "The lower grades of contractility depend entirely upon the organic or ganglial nervous system and influence; the highest form only upon the super-addition of the nervous system of voluntary motion and sensation." (*Author's Physiol., Notes on.*)

[†] "Conscious *Sensibility* is confined chiefly to certain parts and textures of the body, and is dependent upon the part of the nervous system of which the encephalon is the centre. *Contractility* exists throughout the whole animal structures, although in different grades, and is, with the exception of its highest grade or species, entirely independent of sensibility and volition: — contractility is a general expression of life, sensibility of the higher functions only of this principle." (*Notes*, &c.)

cipal amount of disorder, evincing both its nature and primary seat. In these cases, irritable parts become more susceptible of irritation, or *morbidly irritable*, not only locally, but generally also as respects the nervous systems, especially the organic nervous system, upon which the several grades of irritability have been shown to depend. And here, it should be recollected that the term *irritable* admits of two meanings, which should not be confounded with each other: some parts are *naturally and healthily irritable;* and these as well as some other parts become *morbidly irritable*, owing to numerous causes — to excess or deficiency of stimuli, to the operation of noxious agents, or of most of the causes of disease. A morbid state of irritability may be either more or less local or limited, or extended and constitutional; but in either case, the susceptibility of contraction is increased, whilst the power and duration of it are the sooner exhausted. Mr. HUNTER defined morbid irritability to be " an increased disposition to act without the power to act with," with much truth, although with insufficient precision; but it will generally be found, as I have just stated, that the amount and duration of " *power*," will be deficient in proportion to the " increased disposition." In all cases of *morbid irritability*, whether local or constitutional, the intrinsic and extrinsic causes and circumstances connected with it should be considered; and this state, moreover, ought to be carefully distinguished from *irritation;* for the former may exist without the latter, owing to vital depression merely, or to this state associated with others; and the latter may be induced and continued by local agents, where the former can hardly be said to be present, more particularly with reference to the constitution generally. Physically as well as morally, irritation may be caused, and yet morbid irritability may not be present, although the one will favour and aggravate the other mutually. Both states are frequently associated, but they are not necessarily connected.

7. II. OF THE PATHOLOGICAL RELATIONS OF IRRITATION. — If an irritant or stimulus act upon a living tissue or organ, certain changes, having reference to the nature of the functions discharged by the tissue or organ which is acted upon, and to the properties of the agent employed, are thereby produced. If the digestive canal be acted upon by one particular irritant, certain of its actions are augmented or modified; if a different irritant is employed, others of these actions are increased; and if the irritant be more powerful or in excess, the effects are locally heightened and extended to remote parts. If the external structures and organs be irritated, sensibility is excited, and all the functions of the part more or less increased or otherwise affected. Whatever may be the function of a part, such function will be exalted by a moderate irritant; but it will be disordered or even overturned altogether by an excessive one, owing to the effects thereby produced in the circulation and organization of the part upon which the irritant has acted. Seeing that the operation of irritants is thus different as respects their actions individually, and as regards the tissues chiefly affected by them, and consequently that *irritation* is various in its characters, extent, relations, and consequences, according to its cause and seat, it becomes requisite to the due investigation of this important department of pathology to analyse it more fully.

8. i. RELATIONS OF IRRITATION TO THE NERVOUS SYSTEMS. — *A. To the Organic or Vital Nervous System.* — The vital actions of a part, and contractility in particular, have been shown, both here, and in the places already referred to, to depend upon this system. When a tissue is irritated these actions are affected, and it may, therefore, be reasonably inferred, that the cause of irritation acts chiefly upon the system by means of which these actions are produced, and that, in consequence of changes in the parts of this system distributed to the tissue or structure which is irritated, the effects of irritation are developed. If a portion of the intestinal canal be irritated either by mechanical or chemical stimuli, its contractility is first augmented. If the irritating cause, or the irritation however excited, continue for a time, the secreting functions and the circulation are affected: and if it be energetic or excessive, these are still more increased, and sensibility so obscurely bestowed on this part is acutely roused. In addition also to these changes, the irritation, which was limited, whilst it was slight, to the parts more immediately subjected to its causes, now extends itself, influencing different systems and parts: and, owing to the connections of the organic nervous system with the cerebro-spinal, not only is sensation acutely affected, but also the contractions of voluntary muscles are violently excited, without either the influence or the control of the will.

9. Irritation thus originating in parts endowed chiefly by the organic or vital nervous influence, will either continue more or less *limited in its sphere*, or *extend itself* to various parts according to the general susceptibility of this system, to the predisposition or susceptibility of particular organs, and to various concurring or determining causes. — *a.* Where the irritation is slight relatively to the amount of organic nervous power, or where the susceptibility is not increased, the *limitation* of it to its original seat may be long continued; but where it is more considerable, organic nervous power being low, and the susceptibility either general or local consequently high, it will *extend itself*, or manifest its effects, more or less prominently, in remote situations. The *limitation* of irritation may be so complete that one function only of one organ is affected; but this seldom is of long duration without other functions and organs experiencing disorder. Thus, owing to mental emotion acting as an excitement to the cardiac nerves, palpitation or excessive action of the heart is produced; and in consequence of the irruption of bile into the intestines, increased action of their coats is occasioned; but this discharge seldom is great or continued, without producing augmented secretion from the intestinal mucous surfaces generally, and increased determination of blood and other changes of the vascular system, consecutively, as will be hereafter shown.

10. *b.* The *extension of irritation*, particularly when seated in an internal or vital part or viscus, takes place either *directly*, by means of the communicating ramifications of the organic or ganglial nervous system, or *indirectly*, and by a *reflex* operation of the ganglial nerves, conveying the morbid impression or action to the roots of the spinal nerves, or to the spinal chord and brain, and

thereby exciting the sensations or actions of parts supplied with nerves by the cerebro-spinal system, or in both these modes, either consecutively or contemporaneously. These two distinct ways by which irritations or impressions are transmitted to parts remote from the seat of impression, were pointed out by me, many years ago, and described by the terms *direct* and *reflex sympathy*. (See *Physiological Notes*, &c., 1824.)

11. *a.* The *direct transmission* of irritation may take place either along parts or tissues similarly constituted, as mucous or serous tissues, or from one organ to another, by means of the organic nerves with which they are supplied. In this manner, irritation of one part of the intestinal mucous surface often proceeds along it; or irritation of one part of the muscular coats of the bowels frequently extends along the tube, or affects it to a greater or less extent, as in colic and hysteria. The morbid impression also, made upon the organic or vital nerves of one tissue or viscus, is often transmitted thence to an adjoining, but differently constituted, organ through the medium of these nerves, which are supplied to both. Thus, the irritants which affect the nerves of the duodenum or of the stomach primarily, extend their operation in many cases also to the liver and pancreas; and stimuli which excite the stomach raise the action of the heart and vascular system. Irritants of the kidneys frequently render the urinary bladder more irritable, or excite this latter viscus; and those of the rectum often extend their influence to both the urinary and genital organs. In cases of this description, it may be asked whether irritants or stimuli applied to an involuntary part excite the contractions and vital actions of such part by producing an impression on the organic nerves which is conveyed to their corresponding ganglia, and reflected thence by these nerves upon the muscular fibres which they actuate; or whether they act directly and without the intervention of the ganglia, independently of any reflex operation, and simply by affecting the state of the nerves themselves — by affecting the organic corpuscles and fibriles entering into the organization of the part. I would incline to this latter alternative; although I admit that the ganglia may generate an additional vital influence, reinforcing that with which the tissues and organs are endowed. The truth of this inference is confirmed by the fact, often observed by me and others, that involuntary contractile parts, as the heart and portions of the intestinal canal, may be excited to contraction even when removed from their connections with the ganglia.

12. *β.* As I have shown, when treating of various diseases originating in the nervous system, irritations commencing in the organic nervous system are often propagated to the cerebro-spinal system and thence *reflected* upon external and distant parts, either affecting the nerves of sensation, morbid sensation or pain being felt in parts to which such nerves are distributed, or exciting those of voluntary motion, so as to remove them out of the due control of the will. In this manner I explained, in the early parts of the work (published in 1832 and 1833), the origin of several spasmodic and convulsive diseases; and insisted, that the irritation thus conveyed to the roots of the spinal nerves, by means of the communicating ramifications of the grey or ganglial nerves, either might reach the spinal chord and brain, thereby exciting involuntary or automatic motions of involuntary parts and conscious sensation, or might affect the nerves of motion and sensation, and the parts supplied by them; the cerebro-spinal axis being only contingently implicated.*

13. *B. Relations of Irritation to the Cerebro-spinal Nervous System.* — That irritation of a part, as of an extremity, will excite contractions of the muscles of the same or of an adjoining part, independently of sensation or of the intervention of the brain, has been illustrated by Dr. M. Hall; but instead of attributing this to a "*reflex function*," as he has done, it may be explained, as I have many years ago attempted in a work already referred to, by means of a "*reflex sympathy*." Dr. Hall and Mr. Grainger, in endeavouring to establish the existence of this as a distinct function, have attempted to connect it with a particular organization of the spinal chord; and to show that there are not only nerves of sensation and voluntary motion, which have an intimate connection with the brain, and are actuated by it, but also a distinct class of nerves, which are independent of this organ, and arise from the spinal chord. This class he has denominated the "excito-motory," and "reflecto-motory" nerves. Dr. Hall limits the phenomena of reflex action to this class of nerves, and denies the cerebral nerves of special sense the power of producing them. He supposes the reflex motor actions to be in no case excited by sensation, nor even by means of the sensitive nervous fibres. He maintains the existence of spinal nerves, endowed with the "excito-motory" function; and the reflex action he supposes to be conveyed, not by the nerves of spontaneous motion, but by special fibres, which he calls "reflecto-motory." This theory of excited and reflex movements being produced by nervous fibres which are distinct from those which reach the centres of sensibility and volition in the brain, has been supported by Mr. Grainger and Dr. Carpenter. The former believes, that the fibres of the roots of the spinal nerves, which pass into the chord, and are lost in the grey matter, as demonstrated by Weber, Bellingeri, and himself, are the true excito-motory and reflecto-motory fibres. Such may or may not be the case; or the nerves which thus originate in the grey matter of the chord may be destined to transmit to the ganglial system the influence generated by this part of the chord, thereby reinforcing, and, in certain places or ganglia, modifying the influence proceeding from the organic nervous system itself. Thus, the ganglia supplying the heart, the genital organs, and the outlets of mucous canals, are reinforced by nerves from the spinal chord; and it seems much more probable that the grey matter of the chord gives origin to them, and generates an influence necessary to the due performance of the functions of these parts, than that it gives origin to a class of nerves, the existence of which, as well as of their imputed functions, is altogether hypothetical.

14. The chief phenomena adduced in favour of an "excito-reflecto-motory" function, of its inde-

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* The reader is referred to the articles Cholera, § 23., Chorea, § 16., and Convulsions, §§ 42—46., the last especially, for remarks upon *reflected irritation*, which were written in 1830 and 1831, and published in 1832, long before the appearance of Dr. M. Hall's views on the subject, and explained by him by means of a "*reflex function*."

pendence of sensation, and of the grey matter of the chord giving origin to nerves destined to perform this function are — 1st. That reptiles and various others of the lower animals, when decapitated, may still evince motion of a part when its surface is irritated: — 2d. That an apoplectic or paralysed person may retract or move the paralysed limb when it is pinched; and 3d. That infants, when asleep, may clench their hands when the palms are irritated. The same explanation applies to these several phenomena. But as long as they admit of explanation without calling into our aid the existence of a new and special apparatus for this purpose, the material presence of which is not demonstrated or even rendered probable, we are bound to refer them to the organization which is generally admitted, as parts of the offices discharged by it. In reptiles, and even in higher orders of animals, it has not been ascertained how far sensation is extended throughout the nervous system, or how closely it is confined to the brain, or the ganglia serving the offices of the brain. The distinctions, moreover, existing between conscious and inconscious sensations have never been attempted to be drawn; unless, indeed, in the brief manner I have attempted, many years ago, in my physiological notes. That the brain is the seat of conscious sensation, in the higher animals especially, will not be denied; but that a species of sensation — a susceptibility of motion and action, particularly of such motions and actions as have become habitual, is retained and exerted under the influence of certain stimuli or irritants, when the brain is no longer conscious, or even after its removal in young or in the lower animals, cannot be doubted. The mere turning in bed, whilst a person is soundly asleep, is a proof of this; and the motions of a limb, upon irritation of it, in apoplexy or in paralysis, is of a similar description. In these cases, the brain is not in a condition to manifest consciousness; but, with the rest of the nervous system, it may still be so impressed by an obscure feeling of uneasiness as to give rise to motion or change of position. The explanation given of these phenomena by Dr. M. HALL would have been more convincing, if a different one, equally, if not more conclusive, could not have been offered. For, if the facts and arguments adduced in the article IRRITABILITY, and elsewhere, be received, it will necessarily follow, that the irritation of parts acted on by volition will give rise to contractions of them, as in involuntary parts; seeing that the nerves of volition are merely superadded, in the former, to the organic or ganglial nerves, which supply them in common with all other contractile parts; and that contractions will thus take place in them independently of the transmission of the irritation by means of excitory fibres to the chord, in order to be reflected back again by means of other fibres. Even granting that the irritation is conveyed by nerves of sensation, it does not follow that it shall reach the chord itself, for it may only proceed as far as the ganglia on the roots of the nerves, and there partially affect the motory fibres corresponding with the sensitive fibres, without giving rise to conscious sensation.

15. Moreover, as the nerves of general and special sensation may be viewed *as originating in the tissues and organs they actuate, and the parts they endow*, as shown to be the case in respect of the organic or vital nerves, and as converging to the spino-cerebral axis,— being in fact centripetal nerves,— it may reasonably be expected, that irritation of a part will often give rise to motions of corresponding or associated parts, without the brain, or even the spinal chord, under certain circumstances, co-operating in the act, or taking cognizance of it. These nerves are thus expanded in the tissues and organs, so that an impression or irritation in any one point, however minute, is transmitted from them to the central organs of perception and volition, where it gives rise to conscious sensation, if it be sufficiently strong, and if these organs be in a state capable of discharging these functions; but when they are incapable of consciousness, as in sleep, apoplexy, &c., or when the impression is so weak as not to excite this function, still motions of voluntary muscles may follow, owing to "*reflex sympathy*," as explained in my *Physiological Notes*, already referred to. When the bronchial secretion rises to the larynx, it there irritates the nerves of sensation supplying this part; and the irritation, if the patient be awake, generally becomes an object of consciousness, giving rise at the same time, and by a reflex sympathy, to increased, or spasmodic action of the muscles of respiration: in such cases, as I have pointed out in my "*Notes*," the irritation is conveyed by the nerves of sensation to the cerebro-spinal axis, and thence reflected by the associated nerves of motion upon the muscular apparatus which the latter nerves supply. In many of these instances, the reflected motions, consequent upon the irritation, take place, although in a much less degree, when the brain is incapable, as in sleep, of taking due cognizance of the primary irritation; yet this is no sufficient proof, either that the brain is unnecessary to their production, or that the spinal chord alone performs them, or that a particular organization of both the chord and nervous system is destined for their performance. In the particular illustration now adduced, it is just as probable that the irritation excites the nerves of motion, independently of both brain and spinal chord, as that it acts through the intervention of one or both of them. To infer, then, that the chord contains, or is the centre of an apparatus destined to discharge certain offices, which offices may be readily performed by the agencies, and in the modes, previously conceived, and which consist merely of the reception and transmission of irritation or excitement, by sensitive and organic nerves, and reflecting such irritation by means of motory nerves upon voluntary muscles,— the grey matter of the chord receiving the fibres supposed to convey the irritation, and originating those transmitting or reflecting it upon the muscles, — is to suppose the existance of an organization too important for the amount of function to be performed,— is to assign a means of much too wide and great extent, for a contingent or an occasional office; and one, moreover, of the existence of which there is no visible, or palpable, or demonstrative proof.

16. If the apparatus argued for by Dr. M. HALL and Mr. GRAINGER really did exist, no reflex action could possibly occur when the spinal chord is destroyed; yet, nevertheless, the destruction of the chord could not be a satisfactory proof that reflex actions depend solely on it, seeing

that the vitality of the animal receives such a shock from an injury so very extensive as this, as would prevent these actions from being manifested. Indeed, some experiments which I have made induce me to infer, that reflex motion may take place independently of the spinal chord itself, and by means of the connections subsisting between sensitive and motive nervous fibres, in the various ganglia and plexuses, and that the isolation of those and all other sympathetic actions in a single part contended for by these writers is not consistent with the connected and reciprocative functions of the different parts of the nervous system. Moreover, it should be recollected that it is not motion alone that is thus reflected from the seats of irritation. In some cases, more especially when the irritating cause affects the organic nerves, or when parts chiefly supplied with them are affected, pain or morbid sensibility either alone, or in connection with disordered muscular action, is manifested in remote or corresponding parts. Hysteria and various spasmodic affections furnish sufficient illustrations of this.

17. In convulsive and spasmodic diseases, which have received specific but conventional appellations according to the forms they assume, we observe that irritation of sensitive and ganglial nerves gives rise to abnormal actions of the muscles, without any sufficient proof being furnished of the spinal chord being actively engaged in the circle of morbid action; and when the spinal chord or its membranes have presented any lesion after death from these diseases, there is every reason to infer that such lesion was merely an occasional contingency, the irritation being conveyed by these nerves to the plexuses and roots of the motory nerves, and reflected thence by the latter nerves upon the muscles, without the spinal chord being necessarily brought within the sphere of morbid action.

18. Irritation, therefore, whether of sensitive or of organic nerves, gives rise, in the cerebro-spinal nervous system, owing either to the propagation of the morbid impression in a direct manner, or to the transmission of it in the first instance to the roots of the spinal nerves, or to the spinal chord itself, and the reflection of it thence — 1st, to *spasmodic* or *convulsive actions* of voluntary muscles, as shown in the articles CHOREA, CHOLERA, CONVULSIONS, DISEASE, &c. — 2d, to *pain* or *altered sensibility* of some part of the surface of the body, or of particular nerves, or of a limb. — Irritation, also, of one portion of the cerebro-spinal nervous system may *directly* affect distant parts, or *indirectly* or mediately and by a *reflexed sympathy*, as already mentioned. When the irritating cause is in the brain or medulla oblongata, the functions of sensation and perception may be deranged, either solely, or in connection with morbid volition and muscular action or motion. In such cases, the irritation is *central*, its effect *direct* and immediate, and manifested chiefly in the functions performed by, or intimately connected with, the tissue most seriously affected. When the irritation is seated in the spinal chord, and is unattended by effusion or other cause of pressure on the chord, muscular action only may be excited, but generally excited in such a manner, or to such an extent, as to be no longer amenable, or to be imperfectly amenable, to the control of the will; or sensation only may be affected in various grades, the spinal irritation manifesting itself in the ramifications of sensitive nerves, and the morbid sensation becoming an object of consciousness through the instrumentality of the medulla oblongata and brain; or both muscular action and sensibility may be conjointly disordered. Illustrations of irritation of the central parts of the nervous system are constantly appearing in practice. When irritation is seated in portions of the grey or effective portions of the brain, the states of the mind, the sensations, and special functions of sense are chiefly disordered. When it extends to or affects the fibrous structure, muscular actions are deranged. When it commences in the medulla oblongata, general sensibility, the respiratory functions, and voluntary motion are disordered, according to the extent and grade of the primary morbid condition. When it implicates the spinal chord, the consequences vary with its seat, or as the grey or fibrous structure, or the anterior or posterior columns are solely or chiefly affected by it.

19. It has lately been supposed, as above stated, that the sympathies which I have called reflex, and those irritations which are propagated to the spinal chord, and reflected thence to remote parts of the external surface or to the extremities, with the tonic contractions of the sphincters, are essentially dependent upon the grey substance of the chord; but there is much more reason to believe that this substance is chiefly concerned in generating an influence necessary to reinforce and increase that produced by the ganglial nervous system; and that this influence is conveyed by nervous fibres to the plexuses and ganglia of this system, and to the muscles of voluntary motion. Irritation, therefore, of the grey tissue of the spinal chord will thus affect the thoracic and abdominal viscera obscurely, indirectly, and through the medium of the ganglial system; but more directly and obviously the muscles of voluntary motion, the actions of which will be thereby removed more or less from under the control of the will, and thus become involuntary or automatic. It is very probable that the continued action of the sphincters very much depends upon this part of the chord; but in this case the action is *direct* — is immediately dependent upon this organization, and not merely reflex; but it may be allowed, that, in common with all other muscular actions admitting of being influenced by volition, irritation in the vicinity of sphincters will induce, both directly and indirectly, as above explained, increased contraction of the sphincters.

20. It has likewise been supposed that the spinal chord, and more especially the grey substance of it, is the source of irritability. I have already ascribed this very important, and indeed chief manifestation of life, to the organic or ganglial nervous system, whether as manifested in the voluntary or in the involuntary muscles, — in hollow muscles or in sphincters; the fibres proceeding from the spinal chord conveying the influence generated in this quarter to these parts, and reinforcing, increasing, or otherwise influencing, that which is produced by the ganglial system; this latter system being, however, the chief source of the tone and irritability of these several orders of muscles. It is, moreover, very probable, although the fact cannot be satisfactorily demonstrated by experiment, that the grey matter

of the chord is that part only which generates the power thus destined to reinforce and increase the power conferred by the organic or ganglial system, and especially to augment the energy which the ganglial system confers upon the generative organs. Thus, whilst these organs have large ganglia and plexuses of organic or vital nerves — (of grey and non-tubular fibres) — with large communicating branches running between them and the other ganglia, very considerable branches of nerves — (of white tubular nerves) — are also sent from the sacral spinal nerves; but, instead of ramifying directly in these organs, they always proceed by the most immediate or direct routes to the ganglia which supply these organs. The sphincters, also, are supplied with organic or ganglial nerves and with spinal nerves; the latter, however, particularly as respects the sphincter ani, &c., proceeding directly to this muscle; so that, although the tonic contractions of the sphincters depend upon the organic nerves, these contractions may be exalted by volition, through the instrumentality of the spinal nerves.

21. Whatever energy may thus be supplied by the spinal chord to the genital organs and sphincters is most probably generated by the grey substance of the chord, whilst the will merely stimulates this energy, and develops it in a more or less active and sensible manner. If we analyze the phenomena manifested by the generative organs, we shall find that the essentially vital and insensible changes and functions of these organs are dependent upon the organic nerves with which they are so abundantly supplied, and upon the connection of these with the rest of this system; whilst the excitation of these functions, and the sensible changes attending such excitation, take place through the medium of the organization of the spinal chord and of the nerves proceeding from it. The former of these classes of phenomena require little remark, further than that they are performed with a degree of perfection proportionate to the strength and constitution of the individual. The latter phenomena are produced in one or other of two modes — either by the influence of the mind upon the nerves of these organs, through the medium of the chord, or by the local irritation of these nerves; the influence of such irritation extending not only to all these organs, but also to the spinal chord, and to the brain, whence it may be again reflected back upon them, and upon other parts.

22. While thus the tone, irritability, and strength of contractile and sensitive parts are furnished by the organic nervous system, and augmented by the influence generated by the grey substance of the chord, irritation, implicating either of these parts of the nervous organization, excites and removes from under the control of the will the functions of the parts which receive nerves from the part irritated; and while irritation of the parts giving origin to nerves necessarily exalts the functions performed by these nerves, whether these be sensitive or motory, yet, if it be either carried to too high a grade, or continued too long, vital exhaustion will succeed. The vital tone and irritability of contractile parts will also be exhausted by the excitement caused by volition, when either energetic or prolonged beyond what is necessary to the healthy developement of these functions.

23. ii. RELATIONS OF IRRITATION TO, AND INFLUENCE ON, THE VASCULAR SYSTEM AND BLOOD. — There can be no doubt of the commencement of many of the diseases, both local and constitutional, of which the vascular system is the seat, in the nerves, more especially in the ganglial or vital nerves supplying this system, and the several tissues and secreting structures. I have attempted to show that this must necessarily be the case in respect of many maladies, both in the article on DISEASE generally, and in those on specific affections. At the same time, I have not only admitted, but even demonstrated, that the blood may be either primarily or consecutively altered from its healthy constitution; and that it may, moreover, present such states as, although they may not amount to actual disease, may strongly predispose to it, and contribute much to the development of it, as soon as the nervous system is subjected to any shock, irritation, or morbid impression; or as soon as some vital, or secreting, or excreting viscus experiences any interruption of its functions; the morbid condition of the blood, in its turn, affecting the nervous systems of organic and animal life, and exasperating or perpetuating disorders primarily seated in these systems.

24. The influence of irritation on the vascular system is well demonstrated by the changes consequent upon irritating the nerves of erectile, glandular, and mucous tissues. We observe excitement of the nerves of these parts produce expansion of the capillaries, increased action of the arteries, and turgidity of the veins. The irritation is thus generally followed by what has been variously denominated *turgor vitalis, vascular turgescence, vital turgescence*, &c.; and this condition, especially when favoured by the tissue, as in irritation of mucous surfaces, or by the temperament, constitution, or diathesis, or by states of the blood, may readily pass into active congestion or determination of blood — its common consequence; or into inflammation, or sub-inflammation; or it may give rise to hæmorrhage. As respects mucous surfaces, cellular tissues, and glandular structures, the usual consequences of irritation are increased exhalation, secretion, and vascular determination or flux; which, if allowed to proceed, or if the irritating cause act violently, is followed by some state or other of inflammatory action and its various consequences.

25. *A. The Relations of Irritation to the several states of Inflammation* are more intimate than have been generally admitted by pathologists. Irritation seated in any tissue, or in a secreting surface or organ, can be viewed, at its commencement, only as connected with the nerves of the part; and in this stage, as well as in those which follow, it is attended by more or less of altered sensibility. In some structures, *morbid sensation* may be the chief disorder throughout its course; but in parts which perform a secreting function, or which are highly vascular, augmented and otherwise altered secretion, and increased vascular determination and action, very generally supervene. In secreting surfaces and glands, an augmented flow of their natural products usually follows the commencement of irritation; and, as the irritation proceeds, or, as it increases, these products generally become not only augmented in quantity, but also changed in quality; and the vascular determination also is increased, or it

assumes an inflammatory form, or one very closely allied to the more chronic or sub-acute forms of inflammation, several of the changes usually consequent upon inflammation also appearing in the advanced progress of the disorder, thus originating in, and chiefly consisting of, irritation in its earlier stages. Diarrhœa, from irritating ingesta, or from cold, and simple catarrh, or catarrhal bronchitis, often furnish illustrations of this course of morbid action; and the more simple, as well as the more complex of the glandular structures, are liable to similar changes. A disorder of function, consisting of irritation or exaltation of the organic nervous endowment of the part, is gradually converted into structural disease, owing to this disorder having affected the secreting, and consecutively the circulating functions, morbid capillary and arterial action ultimately passing into organic change. Many of the forms of inflammation, particularly those which are chronic and sub-acute, originate in irritation, or in a change in the state of the organic nervous influence of the part, the liability to the vascular disease, as well as the grade of action, depending upon the susceptibility of the system in connection with the state of the blood, and with the nature of the tissue or structure in which the irritation is seated.

26. *B. The Relations of Irritation to Hæmorrhages and Serous Effusions* are very similar to those just instanced in respect of inflammations. The irritation which in one constitution would produce some form of the latter, will produce in others some one of the former; the particular effect being, in a great degree, influenced by the states of organic, nervous, or vital power, of the irritability of capillary tone, and of the blood; these states themselves being, in some measure, dependent upon those viscera chiefly engaged in the functions of assimilation and excretion; or, in other words, these several morbid conditions often acknowledging one source, namely, the state of the vital nervous influence. *Hæmorrhages*, particularly those taking place from mucous surfaces, are often traceable to local irritation, in connection with impaired tone of the extreme capillaries, and often with vascular plethora; but something is also to be imputed to the constitution, or individual conformation, as shown by the distinctive characters by which it is marked, and by its hereditary disposition. Many of the phenomena, also, preceding hæmorrhage, as well as some of those attending it, are referrible to irritation; this primary morbid condition of the organic nerves of the part influencing the states of vascular determination and action in the same manner as the irritation or excitement of the sensitive nerves of the sexual organs and of erectile tissues affects the blood-vessels of these parts. — *Serous effusion*, although occasionally a consequence of irritation, is much less frequently so than either inflammation or hæmorrhage; and is met with, as a result of this state, chiefly in leucophlegmatic or lymphatic temperaments, or in persons whose assimilating and excreting functions are impaired or interrupted.

27. *C. The Relations of Irritation to the Production of morbid Nutrition and Secretion*, although contended for by Broussais, and most of the pathologists of his school, are not so manifest nor so uniform, or even general, as they contend. Viewing irritation as simple exaltation of the organic nervous influence of the affected tissue, increased nutrition and secretion might be supposed to be legitimate consequences of it; and as irritation is not merely a simple, but also a morbid, exaltation of this influence, so these consequences might be also inferred to be morbid. These inferences are doubtless correct as regards many cases of morbidly increased nutrition and secretion, especially when the irritation is exerted chiefly upon muscular or contractile parts, and on secreting organs and surfaces. Irritation affecting the nerves of a hollow muscle will, if protracted, ultimately cause hypertrophy of this muscle; and a similar change in the state of the nerves of the liver, or of the digestive mucous surface, will both increase and otherwise change the secretions of these parts. Morbid nutrition and secretion, however, although very frequently proceeding from irritation, do not always thus arise; for either or both these more palpable changes cannot, in many instances, be traced to any obvious grade or form of irritation, so far as irritation can be viewed as *exaltation* of the organic nervous power; they must, therefore, be considered, as regards these instances especially, as consequences of a *perversion* of this power, as I have endeavoured to show in the article Disease. (See § 87. *et seq.*)

28. *D. That irritation should affect the state of the Blood*, particularly when prolonged or excessive in any important organ or tissue, may readily be admitted. The usual effects of irritation upon the vascular system, especially in producing a febrile state, and in thereby impeding the functions of digestion, assimilation, and excretion, must necessarily, more or less, change the blood from its healthy constitution. Even in cases where local irritation does not produce marked febrile excitement, or merely a remittent or intermittent form of it, the quantity, as well as the healthy condition of the blood, may be affected nevertheless. When irritation of a particular tissue or viscus takes place in plethoric persons, febrile excitement or reaction may be very fully manifested, and a consequent change in its constitution may take place with a rapidity co-ordinate with the grade of excitement; but, when the blood is deficient in quantity, or in the proportion of hæmatosine, the febrile excitement may be of either a low, remittent, or obscure form, or be identical with hectic, and the blood may experience still further changes in its quantity and constitution. But, in all cases, much of the effect produced by irritation on the blood will depend upon the temperament and circumstances of the individual, as will be shown hereafter.

29. Whilst, however, this condition thus affects the blood, the states of the blood, in their turn, exert an equally marked effect upon the local consequences or products of irritation; many of the products of morbid secretion and nutrition depending as much upon the conditions of this fluid as upon the irritation which, existing in a particular viscus, has determined these changes to take place in it. Indeed, the materials furnished by the blood often constitute and characterize these changes, the local irritation causing either a discharge of a portion of these materials in the secretions of the part, or their deposition in its structure, thereby giving rise to various organic lesions, more fully described in the article Dis-

EASE (§ 93. *et seq.*), and in the various articles more particularly devoted to each of these lesions.

30. iv. OF THE PROPAGATION, REFLECTION, REACTION, AND OTHER CONSECUTIVE AND SYMPATHETIC PHENOMENA OF IRRITATION.— Irritation may act in various modes, or may have its effects limited or extended, in various grades, in different persons, in diversified circumstances, and according to the kind, nature, or degree of the irritating cause. — It may thus be — 1st, Simple or direct, its effects being either local, extended, or propagated; — 2d, Reflected, or conveyed to some portion of the nervous centre or axis, and thence reflected upon distant parts; — and, 3d, Consecutive, sympathetic, or reactive, and constitutional. — As to each of these modes, it requires a more particular consideration.

31. *A. Simple and direct irritation* is, (*a*) at first, *local;* and, in this state, it may continue for some considerable time, or for a period so short as hardly to admit of appreciation; and (*b*) it may *extend* or propagate itself, or its effects, to more distant parts. The extension of the morbid action, condition, or impression, of which irritation consists, varies, — 1st, with the nature and intensity of the cause producing it; — 2d, with the state of organic nervous or vital power; — and, 3d, with the conditions of the blood and of the excreting or depurating functions. When the cause is intense in its operation, and at the same time contaminating, vitally depressing, or poisonous, relatively to the state of vital power or resistance, the irritation, or local effect, produced by such cause is rapidly extended, by means chiefly of the organic nervous and vascular systems, to adjoining parts, and even to the whole frame. On the other hand, when the cause is merely mechanical, or simply irritating, without being depressing or contaminating, the constitutional energies continuing unimpaired and the blood uncontaminated, the irritation may be long in producing more extended effects, or materially injuring the frame. It is chiefly when the organic nervous influence is weak, the secreting and excreting functions are already impaired, and the blood more or less morbid, that irritation is rapidly followed by severe local and constitutional disorder. When the blood is superabundant as to quantity, and especially as to the quantity of hæmatosine or fibrine and albumen, relatively to that of serum, — when the blood is thus rich and inflammatory, and the temperament and diathesis are sanguine and phlogistic, then the irritation, unless its cause be poisonous or contaminating as well as irritating, soon assumes an inflammatory character, and is quickly followed by all the local and constitutional effects of inflammation.

32. When the irritation is slight or moderate, the blood being neither superabundant nor rich, or even somewhat deficient or thin, and the temperament being phlegmatic or lymphatic, then it may not produce great change, either locally or constitutionally, until it has continued long, or affected the secretions of the part; but when these states of the vascular system are coexistent with the nervous or irritable temperament, the local, and especially the remote and constitutional, effects of irritation will be quickly and severely manifested, particularly on the nervous system, and on muscular or contractile parts. Illustrations of these facts occur frequently in practice, and are met with in many of the affections characterized by extreme pain and spasm. Irritation is influenced, as to grade and consequences, not only by the temperament, diathesis, and states of the blood and of the secretions, as just stated, but also by organic nervous power, and by whatever tends to depress or vitiate this power, or to contaminate the blood.

33. In depressed states of vital power, irritation more rapidly developes its effects, other circumstances being equal, than when this power is unimpaired; the resistance exerted by the constitution to the morbid impression or irritation being weaker, and consequently the less capable of overcoming this primary affection, which increases and extends itself with a rapidity co-ordinate with the vital or the organic nervous depression or exhaustion. Morbid conditions of the blood, arising from the passage of contaminating matters into it, or from the accumulation of effœte materials in it, owing to deficient or interrupted action of eliminating organs, exert an equal, if not a still more remarkable influence, in favouring and in accelerating the extension and consequences of local irritations. Punctures, external abrasions, local injuries, the acrid, contaminating, and animal poisons, and numerous other causes acting locally, or even on the minutest point of the organism, produce effects of the most severe and deleterious character in these circumstances of organic nervous power and of the circulating fluids; and, although these causes are often deleterious in the most healthy conditions of the frame, yet are they very much more so in the circumstances just now stated, occasioning the worst forms of erysipelas, diffusive inflammations of the integuments and subjacent cellular tissue, the most violent constitutional disturbance, contamination of the blood and soft solids of the body, with effusion into shut cavities and other lesions, and ultimately death.

34. *B. Reflected Irritation* may be of *three kinds;* namely, — (*a*) The irritation may occur in a surface or part of a viscus supplied either chiefly or solely with organic or ganglial nerves, and be transmitted to the ganglion by the nervous fibres first affected, and thence reflected upon these fibres themselves, or upon others supplying different structures, or communicating with other parts of this system, or with the cerebro-spinal axis. — (*b*) The irritation may commence as in the preceding variety, and extend to either the roots of the spinal nerves, or the chord itself, and thence be reflected, in the form of pain or spasm, to superficial parts, or to the extremities. — (*c*) The irritation may commence in, or affect, the nerves of sensation in these last situations, be transmitted to the spinal chord, or to the roots or ganglia of the spinal nerves, and be reflected thence by sensitive and motory nerves, occasioning altered sensation, morbid sensibility, or convulsive or irregular movements. These several modes of reflected irritation occur most frequently in nervous and irritable temperaments, and in persons neither plethoric nor robust.

35. *a. The first of these* often attends visceral disease, both functional and organic, hysteria, the several forms of colic, constipation, gastro-intestinal disorders, visceral neuralgia, or painful affections of the abdominal organs, and diseases of the

sexual and urinary organs, but generally in irregularly or imperfectly manifested states. Irritation of the nerves of the uterus or ovaria, or exaltation of their sensibility, may be extended to the ganglia, from which these nerves depart; and be reflected thence, not only upon these organs themselves, but also upon the intestinal canal, giving rise either to irregular movements of its muscular coats and to borborygmi, or to altered sensibility, or to abdominal pains, such as I have described in the article Hysteria, or to both spasm and pain, as in hysterical colic. The irritation of calculi in the pelvis of the kidney may be extended to the renal ganglion, and be thence reflected upon the digestive tube in the form either of colic, or of nausea or vomiting. The irritation of calculi in the bile-ducts may, in a similar manner, be reflected upon the duodenum, stomach, or other abdominal organs.

36. *b. The second variety* of reflected irritation, or that extending to the cerebro-spinal nerves, and from thence expressed upon superficial or distant parts, may exist either alone or in conjunction with the foregoing variety, as in the several forms of hysteria, especially the more irregular forms of it, in chorea, in verminous complaints, in symptomatic epilepsy, cholera, &c. In these affections, as shown in the articles devoted to them, irritation affects a certain portion of the organic nervous circle, and extends to corresponding ganglia, and is thence reflected upon the fibriles of grey nerves supplying other viscera, or upon those communicating with the roots of the cerebro-spinal nerves, occasioning either altered sensibility or extreme pain in the extremities of the nerves of sensation, or spasmodic or uncontrolled movements of the voluntary muscles, through the medium of the nerves of motion. The convulsive affections of infants and children are frequently thus produced, without any disease of the brain; although the circulation in this quarter generally is affected in the course of the convulsion, owing to the disorder of the respiratory processes attending it, and to the impeded passage of blood through the lungs and heart. The irritation of worms in the intestinal mucous surface gives rise not only to various painful and spasmodic states of the canal, and to palpitations of the heart or of the abdominal aorta, but also to convulsions and spasm of voluntary muscles in the manner just explained, and as I have stated in the article Chorea (§§ 16, 17.). In 1820 I treated at a dispensary a case, characterized by constant clonic spasm or convulsive movements of the abdominal muscles. The cause was instantly recognised: spirits of turpentine were prescribed, and immense accumulations of fæcal matters and many hundreds of lumbrici were evacuated; and then the convulsions of the voluntary muscles ceased. This case was published (see *Lond. Med. Repos.* vol. xvii. p. 242.), soon after its occurrence, and was explained as above. Other illustrations of this form of reflected irritation might here be adduced, but they are unnecessary; others will be noticed hereafter.

37. *c. In the third variety*, or when the irritation implicates, or is seated in, the cerebro-spinal or sensitive nerves, and is transmitted either to the plexuses of nerves, or to their roots, or through these to the spinal chord, and even to the brain itself, and is reflected thence so as to manifest its effects in the form either of spasm or convulsion, or of pain or altered sensibility of some superficial or distant part or limb, then consciousness is frequently affected in some way or other in the course of the process; and, consequently, the functions of the brain are co-ordinately implicated. Still the brain may be no further affected than in being cognizant of either the primary affection, or of its sympathetic effects, or of both. In this case, only one of the functions of the brain is acted upon, and all the other functions are unimpaired and unaffected. But, in other instances, the irritation, owing either to its intensity and extension to the cerebro-spinal axis itself and more especially to the brain, or to the latter organ being implicated in the course which it takes in developing its effects, may so affect the brain as completely to overpower its functions; yet this result rarely takes place without being attended by convulsions.

38. On a careful examination of disorders characterized by convulsions, spasms, or irregular muscular actions, we shall find that they may be divided into — 1st, those which are attended by consciousness; — and, 2d, those in which consciousness is suspended. The one, however, may pass into the other, but in comparatively rare instances. In the former of these, the brain retains the power of sensation, and is not incapable of exerting its functions during the paroxysm; in the latter, conscious sensation is for a time altogether overwhelmed, and is restored more or less rapidly after the attack has ceased. It may reasonably be inferred that, in the one, the primary irritation is propagated to the roots of the spinal nerves only, or to the spinal chord, and reflected thence by the motor nerves upon the voluntary muscles, the brain being still capable of discharging all its functions, excepting that of controlling the muscular movements; in the other, the irritation extends to the brain, or affects it or its circulation, in such a manner as to suspend or to extinguish consciousness and all its modifications for a time. In many, if not all the latter class of cases, the medulla oblongata seems to be the part more immediately implicated: as soon as the affection extends to it, consciousness and the other subordinate manifestations of mind being suspended for a time. (See article Convulsions, § 42. *et seq.*)

39. *b. Severe or neuralgic pains* are often caused by irritation, the source of which may be in the trunk of the nerve whose terminations are thus affected, or in the spinal chord, or in visceral or ganglial nerves passing to the roots of the spinal nerves, or to the spinal chord itself. In this latter case the primary irritation manifests its effects in distant parts by a *reflex sympathy*, as already described, and as long since insisted upon in the works already referred to. In all instances of pain from irritation, whether the irritating cause be seated in the nerve itself, or in the chord, or in other or distant nerves, the effect being reflected by means of either the chord or of ganglia, it is expressed chiefly in the ultimate ramifications or smaller branches of nerves. When the pain is seated in the trunk of a nerve, it will generally be found that the sheath or neurilema of such nerve is inflamed, either in the seat of pain or near it. In a case recorded by Dr. Denmark, where extreme pain was felt in the points of the fingers and

thumb, the limb was amputated, and a small portion of a ball, which had been detached from it when it struck against the bone, was found imbedded in the fibres of the median nerve. In several cases which have occurred in my practice, as well in others recorded by authors, irritation and chronic inflammation of the spinal chord or of its membranes have been attended by pain in nerves, chiefly of their extremities, given off from the parts of the chord chiefly affected. Numerous illustrations of this are given in the article NEURALGIC AFFECTIONS. In nearly all cases where the pain is caused by irritation merely, it is intermittent or periodic, or returns only after distant intervals. But when it is produced by inflammation, or by irritation of an intense and permanent kind, it is either continued or remittent only. When it proceeds from the former cause, it is sudden in its accession, intense in grade, often brief in duration, and it generally ceases suddenly. When it arises from the latter cause, it is more gradual in its increase and subsidence, and more permanent than in other circumstances.

40. The cases of pain from irritation, expressed in distant parts by reflected sympathy, furnish some very singular phenomena, which fall more particularly under consideration in other articles. These are characterized chiefly by their seat, intermittency or remittency, and by the non-febrile and non-plethoric states of the vascular system, in the very great majority of instances. Thus, irritation of the stomach or bowels, by accumulated matters, or by acidity, or by flatulence, or by morbid secretions, often causes severe pain in distant and superficial parts, or even in less remote organs. A gentleman was seized suddenly with a violent pain in the heart. I was called to him, and whilst I wrote a prescription, I directed him to swallow two or three small pods of Cayenne pepper, which were at hand in a bottle of pickles. He instantly afterwards eructated much flatus, and the pain as instantly ceased. Pains of short duration, but of great severity, are often experienced during disorders of the digestive organs, in various parts of the body, far removed from the seat of irritation. Thus, pain at the vertex, or in the temple, or in a limb, or in other places, is sometimes felt; but it instantly ceases upon the escape of accumulated flatus, or upon the neutralization of acid in the prima via, or after the operation of an emetic or of a brisk cathartic. (See article NEURALGIC AFFECTIONS.)

41. C. *Reactive, Consecutive, and Sympathetic Irritation.* — In certain circumstances of the œconomy, especially those which will be noticed hereafter, irritation gives rise to general vascular reaction, or to various consecutive and sympathetic effects, having a more or less obvious relation to the state and grade of the primary affection. In most instances, the first effect of irritation is displayed in the vessels of the part, in one or other of the modes described above — in either inflammatory action or hæmorrhage; but in some cases, the irritating cause, owing to its nature, or to the part irritated, or to the constitution and diathesis of the individual, gives rise to very severe febrile commotion, or to various consecutive phenomena of either a painful, or a spasmodic or convulsive kind, without the local vascular disturbance being remarkable; and these effects may be general as respects the œconomy, or more or less limited in extent, or may change their seats and character. Chemical irritants, and various vegetable and animal poisons, produce these effects, which usually present a very marked speciality, their characters varying with the cause which produced them, and with the circumstances in which they are developed. Thus, the irritation of the digestive mucous surface, or of some part of it, by worms, by acidity, by flatulence, by noxious ingesta, or by accumulated sordes, frequently is followed by spasmodic movements of the voluntary muscles, by painful affections of the joints, by neuralgic or rheumatic pains, by gout, and by various visceral affections of a painful or of a functional kind.

42. The presence also of morbid elements in the blood, or the accumulation of those materials in it which require to be eliminated, will not only occasion irritation of some portion of the organic nervous system, but more especially of that portion which is supplied to or actuates the organs destined to the elimination of these materials, but will, at the same time, favour the rapid development of the reactive and sympathetic effects of the more local affection. Gout, erysipelas, and several other diseases, illustrate this principle; indeed, most of the disorders which are seated principally in the excreting organs furnish proofs of the truth of this view. From the foregoing it may be safely stated, that the sympathetic effects of local irritation are to be traced by means — 1st, of the nervous system of organic and animal life; — 2d, of the vascular system and blood; and, 3d, of the excreting viscera as influenced by the organic, nervous, and vascular systems. But the consideration of these, if further pushed, leads to the following part of the subject, which is very intimately connected with the foregoing general views.

43. v. CONSTITUTIONAL EFFECTS OF IRRITATION. — The principal and most serious effects of irritation are ascribable — 1st, to the nature of the irritating cause; — 2d, to the state of organic, nervous, or vital power, especially as manifested by the irritability of contractile parts; — 3d, to the state of the circulating fluids, particularly as respects the accumulation of excrementitial or noxious materials in the blood; — and, 4th, to the functions of eliminating and depurating organs. — *a.* Of the influence of the *causes* in determining the evolution as well as the kind of constitutional commotion produced by irritation, sufficient notice will be taken hereafter; and I have already shown (§ 31.) that the effects of irritation are, cæteris paribus, more extensively, more rapidly, and more severely propagated throughout the frame, the more the organic nervous or vital power is depressed at the time when the irritating cause is in operation.

44. *b.* When the circulating fluids are loaded with noxious elements or materials, in consequence either of interrupted excretion, or of the absorption of injurious matters, not only is the vascular system the more readily excited thereby to increased action, but the vital power is also greatly impaired at the same time; and hence, although vascular action is augmented, power is diminished, and the sooner altogether exhausted. The impeded or interrupted action of depurating or excreting organs, in first causing a morbid state of the blood, exerts, according to the extent of this primary effect, a similar influence, in developing, acce-

lerating, and aggravating the constitutional operation of local irritants; and hence the necessity of bringing our means of cure to act upon these organs in all cases of local as well as of constitutional irritation. The influence apparently arising, in connection with irritation, from a superabundance or deficiency of blood, and from a too rich or a too poor or watery state of this fluid, has been already noticed, particularly with reference to the supervention of inflammations, hæmorrhages, and various spasmodic and nervous affections; but these conditions of the vascular system seldom give rise to so rapidly developed, so severe, or so dangerous commotions of the whole œconomy, as when the blood is loaded with excrementitious materials, and when important emunctories are interrupted or impeded in their functions. It may be, therefore, inferred, as a pathological axiom, that, other circumstances being the same, the constitutional effects of local irritants, will vary with, and be proportionate to, especially in the rapidity of their development and in the severity and acuteness of their characters, the grades of vital power, and of vascular purity, and the states of the several emunctories. In proportion as power is reduced, and the blood is impure or changed from its healthy state, so the brain becomes oppressed, the soft solids contaminated, the vital cohesion of the tissues weakened, and the depurating organs impeded; effusions of serum, sero-sanguineous exudations, hæmorrhages, and various structural changes ultimately supervening, with more or less rapidity. Erysipelas, local irritants giving rise to diffusive inflammation of the cellular tissue, wounds or injuries, and punctures followed by severe disturbance, and many acute affections consequent upon irritating and morbid poisons, furnish sufficient illustration of these inferences.

45. vi. OF THE CONTINUITY, PERIODICITY, DURATION, AND TERMINATIONS, OF THE EFFECTS OF IRRITATION.—*A.* The effects of irritation are seldom *continued*, or of equal severity throughout, unless they be aggravated by morbid conditions of the blood, or by impeded action of the emunctories. In such cases they may be progressively acute or severe, until they terminate fatally, without any appreciable intermission or even remission. The blood may also be more or less contaminated, particularly by the absorption into it of morbid secretions, and yet the effects will still assume a periodic or remittent form, as in cases of hectic fever; but very generally the constitutional effects of irritation are continued when the blood is much contaminated either by absorbed matters or by uneliminated elements, as shown by most of the forms of erysipelas, by the consequences of punctured, poisoned, or contaminated wounds, and by numerous irritating causes acting locally in these states of the vascular system.

46. *B.* The effects of irritation, whether they be spasmodic, or neuralgic, or painful, or constitutional, are most commonly *periodic*, or recur after intervals, or become aggravated by paroxysms, if they do not cease altogether for a time. The recurrence or aggravation of these effects generally observes no regular periods, unless intermittent and remittent fevers be considered as constitutional manifestations of irritation of the organic or ganglial nervous system, in which point of view, indeed, I have chiefly contemplated them in their more simple states. As long as irritation extends no further than the nervous systems, and whilst the excreting organs and vascular system and blood are not greatly disturbed, it generally thus manifests itself more remarkably at one time than another. In many cases, the irritation seems to proceed or to exist in a latent form, or the irritating cause seems to have ceased to produce any results after its more immediate action, until some adventitious circumstance occurs, or some change takes place in the states of organic nervous or vital power, or of the excreting viscera, favourable to the development of its effects; and these effects may either increase progressively or recur more frequently, or they may soon cease altogether, owing either to exhaustion, or to the subsidence of the primary morbid condition.

47. In cases of neuralgic pains, the effects of irritation manifested in distant parts, as above shown, by either a *direct* or *reflex sympathy*, as well as in cases of spasmodic or convulsive movements similarly produced, we observe certain phenomena or circumstances of an important and practical kind; — 1st, That these attacks are immediate, severe, and continued in proportion to the intensity of the irritating cause relatively to the grade of constitutional or vital power; — 2d, That they are favoured and aggravated by whatever lowers the organic nervous energy and vital resistance, the intervals between them becoming shorter or less marked, and the seizures longer or more frequent, the more this power is reduced; — 3d, That these attacks are similarly affected by impaired excretion and evacuation, and by impure or morbid states of the blood; — and 4th, That they are influenced in the same way by mental depression, and by directing the mind either frequently or for a lengthened period to them.

48. *C.* As to the *cause* of the periodicity, or of the recurrence of the effects of irritation, no further or more satisfactory information can be given, than by assigning this character to a law of the animal œconomy which is observed as long as these effects do not extend much beyond the nervous systems, or implicate the more important emunctories and the blood and vascular system. If we attempt to proceed further in our research, we can infer only that all causes exciting or irritating the source of irritability and the sentient system produce their effects on sensibility and on muscular movements in a more or less remittent or paroxysmal manner, the intermissions being complete and prolonged in proportion to the slightness of the cause relatively to the susceptibility of the nervous system and state of vital power. Even the most violent of painful and spasmodic diseases, as neuralgia and tetanus, are characterized by exacerbations during the attack; and these exacerbations exhaust for a time the sensibility and irritability, which however are quickly restored under the influence of the causes which continue to excite them; or in other words, irritation being once excited in any part of the source of irritability or of the sentient system, explodes itself in fits or shocks on those parts most immediately connected anatomically and physiologically with these sources; and when the cause of irritation continues in action, or when the irritation is intense, although the cause which excited it may have been removed, the effects may continue until the vital energies are exhausted, or may even

increase with the vital exhaustion, until life is extinguished, unless some powerful agent be employed capable of fortifying the nervous power and vital resistance, and thereby enabling them to overcome the morbid impression which has been produced, or to resist the operation of the causes which are present, until the parts become accustomed to their influence.

49. *D.* The *duration* of irritation depends chiefly upon the same circumstances as have just been shown to influence the character or type of its effects (§ 45.): these circumstances, however, tend more especially to render the disease more acute, and of shorter duration, than it would otherwise prove. In general, irritation is prolonged in proportion to its slightness relatively to the degree of vital or constitutional power; and it may continue or recur for an indefinite period, as long as vascular action and the states of the blood, and of the emunctories, are not very materially affected by it. As these become deranged or remarkably diseased, so the duration of the resulting malady is equally short; and this is especially the case when muscular contractility is either inordinately excited, or very greatly impaired. Tetanus, rabies, poisoned wounds, &c., are illustrations of the short duration of the effects of irritation when its action is energetic, and when its consequences are extensive in respect of the nervous, vascular, and muscular systems.

50. *E.* The *terminations* of irritation have been partly noticed (§ 23.) when remarking the effects or consequences of it upon the vascular and muscular systems, and upon the secretions and nutrition. The effects of it on these parts of the œconomy are often intermediate between an advanced stage of its development and its termination; but still irritation may arise and subside, or *terminate in health*, without any of its more palpable consequences or strictly structural lesions having been produced; sensibility and contractility having been only temporarily disturbed. — It may *terminate in death* in a very short time, owing to the intensity of its action, or to its violence, as expressed chiefly on the sensibility, or on the muscular and vascular systems, and previously to any very marked effect upon the organization, although generally the secreting and excreting functions, and the changes in the blood requisite to the continuance of life, are either impaired or arrested before death is occasioned. — Irritation may also produce *various lesions*, already alluded to (§ 27—29.), these lesions either superseding, extinguishing, or merely masking the original mischief; or then greatly increasing both it and its effects. Most frequently when irritation terminates fatally, this result is owing more to the changes, often numerous and consecutive, produced by it, than to the violence of this state, as expressed merely on the sensibility and irritability of the frame; although the changes in these latter properties may either altogether, or only partly, produce this last result.

51. III. OF THE INFLUENCE OF THE AGENTS OR CAUSES ON THE STATES AND CHARACTERS OF IRRITATION. — i. *Of predisposition to irritation.* — An increased susceptibility of irritation may arise from a great variety of circumstances. The influence, however, of several of these is not satisfactorily established, or rather, hardly admits of proof. It appears very probable that the usual causes of irritation act more readily, and with greater intensity; — (*a*) On the irritable, nervous, and sanguineous, than on the phlegmatic, bilious, melancholic, and lymphatic *temperaments*; — (*b*) On the scrofulous and gouty *diathesis*, and the delicate and enfeebled *constitution*, than on the sound and robust; — (*c*) On the *young* than on the old, and more particularly on infants and children; — (*d*) On the *female* than on the male sex. Besides these causes of predisposition, others may be enumerated, as hereditary or original constitution; unwholesome diet, and insufficient food; modes of living calculated to weaken and to impede the digestive, assimilative, and depurating functions; confinement in-doors, insufficient exercise, sedentary occupations, and deficient ventilation. All the depressing passions and emotions; solitary confinement, suppressed feelings, and privation of light, sunshine, and fresh air; debility and pre-existing disorder, more particularly torpor of the bowels, and of the excreting organs generally; the superabundance of excrementitial matters in the blood, or the absorption into it of morbid secretions; and either too great fulness or extreme deficiency of the blood — or vital depression and vascular plethora, or inanition, or contamination, either individually or variously conjoined, favour the operation of the more immediate causes or agents of irritation on the frame.

52. ii. *The Exciting Causes.* — The operation and nature of these, conjointly with the state of predisposition, influence and determine the form and character of irritation. — *A.* The *nature and amount of external injury*, especially in connection with the shock sustained by the œconomy on the infliction of it, often produce irritation of a serious kind, both locally and constitutionally; and the particular nature and relations of this effect are often misunderstood, and unsatisfactorily treated. Amongst these injuries, surgical operations may be classed. The nature and character of the irritation also vary much with the nature of the tissue or part primarily affected or injured. Thus a puncture or laceration of a tendon, or of an aponeurotic expansion, will more readily induce tonic spasm or tetanus than neuralgia; and the spasm will more readily be produced in a person predisposed by a combination of circumstances — by an irritable or nervous temperament, by depression of organic nervous and vital power, by accumulations of morbid secretions in the bowels, and by the depressing passions, than in a healthy individual. An irritating body, lodged either between the fibriles of a nerve, or upon its sheath, may so alter the sensibility of its sensitive fibriles as to occasion acute pain in their ramifications and terminations, even without affecting the motor nerves, or affecting them only slightly and occasionally. In many external injuries the cerebro-spinal nerves may entirely escape, and yet the extent of mischief and the shock to the system may be great. In such cases, the other structures may be seriously injured, and especially the organic nerves: these latter affect the circulation in the vessels of the injured part, and consecutively the vascular system generally; and thus extreme suffering, shock to the constitution, and vascular reaction — unless the vital powers are entirely overwhelmed by the amount of injury and the attendant shock, so as to prevent reaction — are successively produced.— In perusing

the numerous instances of surgical operations detailed in various works, the physiological pathologist will readily recognise, in many of the phenomena attending these cases, the effects of irritation caused by the operation. A man is operated upon for axillary or subclavian aneurism, and the ligature placed upon the subclavian artery necessarily produces not only a shock to the constitution, but also irritation as the shock subsides, owing chiefly to the circumstance of the organic nerves surrounding the vessel in a closely reticulated plexus being inclosed, strangulated, or irritated by the ligature. Hence the oppressed breathing, general coldness, and sinking of the vital powers, followed by febrile commotion, and various painful spasmodic and sympathetic affections, according to the peculiar circumstances of the case, so frequently consequent upon such operations.

53. *B.* Numerous *mechanical* and *chemical irritants* produce not only great local, but also, consecutively, much constitutional irritation. These, however, are generally no further injurious, than by disordering or inflaming the parts to which they are applied, unless they are so energetic as to disorganize the structure, as concentrated acids, alkalies, &c. Much of the local and constitutional irritation produced by these, unless they are thus energetic or are brought in contact with an extensive surface, is owing to the states of the system, and especially of the organic functions — deficient vital power, impure states of the circulating fluids, and impaired secretion and excretion, particularly favouring the effects of these agents.

54. *C.* Many substances combine, with much local irritation, a narcotic or *alterative effect* upon the nervous and vital properties. — *a.* These *acro-narcotics* exert a decidedly poisonous effect, characterized not merely by local and general irritation, but also by a specific condition of the vital functions. There are both a local irritation or inflammation produced by them, and a change in the states of sensibility, of irritability, and of secretion and excretion, having a special reference to the agent or cause. Most of these substances are derived from the mineral and vegetable kingdoms, and constitute, owing to their peculiar modes of action, the principal part of our means of curing disease, when judiciously employed.

55. *b.* Numerous *animal substances* occasion either local or general irritation, or both, or combine with this a contaminating or poisonous effect. In some instances their operation, locally and constitutionally, is chiefly of a septic nature, dissolving the vital cohesion of the tissues, and contaminating the circulating fluids; in others, their action is more strictly irritant, in respect either of the organic or of the cerebro-spinal nervous system, or of both, but generally of the former especially; and, again, in others, their influence is both septic, as regards the tissues and fluids, and depressing, as respects the vital endowment. Thus putrid animal matter acts principally in the first of these modes, yet partly also as a local, and, through the medium of the blood and vascular system, as a constitutional irritant. The virus of rabies affects chiefly the nervous systems, irritating, first, the part inoculated with it, and, consecutively, the organic nervous functions, and, lastly, the cerebro-spinal actions. The venom of serpents and insects both dissolves the vital cohesion of the tissues to which it is applied, contaminates them and the fluids, and remarkably depresses the vital manifestations.

56. *c. Acid or excrementitious matters passed into, or accumulated in, the blood* are more frequent causes of constitutional commotion or *irritative fever*, than is generally supposed. Various secretions and excretions, when accumulated or retained, are partially absorbed and render the blood impure (see art. ABSORPTION, § 15.); others, when interrupted or suppressed, are followed by a redundancy in the blood of the materials forming them, which materials are the causes of irritative fever, — of excessive action and greatly depressed vital power. *Urinous fever* or the constitutional commotion occasioned by suppressed or interrupted secretion and excretion of urine, is one of the forms of irritative fever caused by the accumulation of excrementitious or morbid matters in the blood.

57. *d.* The passage also of *morbid secretions* into the circulation, is often productive of the worst forms of constitutional irritation. If these substances pass gradually, so that their elimination from the blood is as rapid as their introduction into it, the consequent irritative fever is comparatively slight, and generally assumes a hectic or remittent form; but when it passes more abundantly and rapidly, as in cases of phlebitis and of diffusive inflammation of the cellular tissue, the constitutional disturbance is very much more serious and acute, and very closely resembles the worst forms of putro-adynamic fever. In lying-in hospitals, where the vital powers are reduced, first by the shock attending parturition, and secondly by the impure air of the ward, and when in consequence of these circumstances the uterus contracts imperfectly, or allows a considerable quantity of the bloody sanies escaping from the vessels on its inner surface to accumulate in it, a portion of this sanies is absorbed or imbibed by the veins into the circulation, and irritative fever or constitutional irritation of the worst and most rapidly fatal form is soon developed. In many of these cases, as I have proved by repeated observation and *post mortem* research, the imbibition or absorption of the matter from the cavity of the uterus, and the consequent contamination of the blood, takes place without producing uterine phlebitis, or at least without occasioning that form of phlebitis which is attended by the production of coagulable lymph in the veins (see VEINS, *Inflam. of*); whilst in others, the uterine and spermatic veins are inflamed, either primarily or coëtaneously, owing to the irritation of the matters retained in the uterus at the mouths of the veins or sinuses left exposed by the separation of the placenta, or as they pass along the veins, during the process of imbibition. The most adynamic and rapidly fatal cases are of the former description, the more inflammatory and prolonged instances are of the latter; but this important subject is fully discussed in the article on PUERPERAL DISEASES AND FEVERS, where the results of long and extensive experience are given. The rapid absorption of fluid effused into the cellular tissue, as in *phlegmasia dolens, œdematous erysipelas, diffusive inflammation of the cellular tissue*, and in cases of *non-encysted abscesses*, is generally followed by constitutional irritation of a most re-

markable kind, vascular action being excessive, but devoid of power or tone, and all the vital and nervous functions being remarkably depressed. In a case of phlegmasia dolens of both thighs under my care in 1832, the swellings very rapidly subsided, but were soon followed by all the symptoms of adynamic or typhoid fever, requiring the free use of restoratives and antiseptics, which produced a most beneficial effect and rapid recovery.

58. *e. All the animal poisons, and all the emanations produced from dead and living organized bodies,* seem to act first as local, and more or less rapidly as constitutional, irritants. The most remarkable of these is the virus or fluid sometimes inoculated when examining recently dead bodies. This poison produces excessive irritation of the nervous systems, locally and constitutionally, with extreme prostration, weakness, and rapidity of the heart's action, &c. soon followed by fatal exhaustion. But, whilst these animal or morbid poisons irritate more or less the organic nervous and vascular systems, they likewise depress their vital manifestations and contaminate the blood and secretions. They act as a kind of leaven which infects the whole œconomy, and imparts to it the power of developing a poison, like itself in all respects, capable of producing the same effects, and thereby perpetuating itself. (See arts. INFECTION; POISONS, ANIMAL, &c.)

59. *f.* Numerous substances irritate the system, when received into the stomach or bowels, or passed into the circulation, each producing an effect having a strict reference to its nature or peculiar properties, and to the quantity of it taken or introduced into the blood. Indeed the operation of a large proportion of medicines depends upon this specific influence, modified, however, by a variety of circumstances, duly considered and taken advantage of by the observant and experienced physician. In cases of irritation from these causes, the local and constitutional effects vary with the tissue or viscus upon which they individually act, with their absorption or non-absorption into the circulation, with the quantity of the substance employed, and with their specific influences on the different emunctories. Substances which are absorbed, or which otherwise pass into the blood, exert, according to their nature or peculiar properties, more or less of irritation of the vascular system, and of the organs by which they are excreted from the blood, modifying at the same time the functions of the mucous and cutaneous surfaces, and the states of nervous influence. Owing to these circumstances, these agents produce more or less constitutional commotion, or irritative fever, unless their influence is slight or is limited to some excretory organ or surface.

60. *g. The sensations* when acutely excited are often causes of irritation, more especially of those parts of the cerebro-spinal nervous system with which they are in the most intimate correspondence. Thus inordinate excitement or irritation of the organs of sense is often followed by inflammatory excitement of the brain, or of its membranes; and of the nerves of sensation in the extremities, or in the general surface, by convulsions. *Morbid sensation* occasionally exerts a similar influence, or reacts upon and augments the primary irritation producing it. Acutely excited sensation may occasion, by either a direct or reflex sympathy, morbid sensations in distant parts, or spasmodic or convulsive movements, or, by exciting the vascular system, or impairing the excreting functions, constitutional disturbance of a more or less severe nature. Indeed this cause, particularly in connection with the excitement of a pleasurable feeling, as in sexual irritation, is a much more common source of the diseases of irritation, or at least of those which are thus characterized at their commencement, than is generally supposed; and it is almost equally prevalent and mischievous in both sexes. Its consequences are manifested both by direct and reflex sympathy, giving rise to disordered function, morbid sensation, disordered or uncontrollable muscular movements, and ultimately to constitutional disease. If we trace the progress of the mischief, we shall detect the effects, first, in the weakness of the various digestive functions, through the medium of the organic nervous system; next, in the cerebro-spinal nervous system, as evinced by morbid sensibility of the spinal nerves, and weakness of the mental faculties, or by affections of the voluntary and involuntary muscles, or by convulsions; and, lastly, in the augmented disorder of all these, in disease of the vascular system, in deficiency and poverty of the blood, and in various nervous, cachectic, and even structural changes, terminating in some instances in death.

61. *h.* Various *moral emotions* and *intellectual powers*, when inordinately excited or exerted, and especially the malevolent passions, anxiety, and some of the depressing feelings, excite more or less of irritation, disturb the circulation in the brain, and disorder the actions of the heart. In addition to their more strictly local effects, particularly in respect of the nervous system, they may also produce violent constitutional commotion, and derange all the secreting, assimilating, and excreting functions, this latter effect increasing still further the vascular or febrile disturbance. The mental emotion may even irritate particular organs, according to its nature, as the heart, the urinary and genital organs; and the physical effect may in its turn be a source of irritation to other parts. The mental emotion, also, may be of so violent a nature as to give rise to convulsions, or altered sensibility of remote parts, previously to vascular or other disorder of a general kind having been produced.

62. In estimating the influence of moral or physical causes in exciting local or general irritation, too great importance should never be attached to one or even two causes only, without endeavouring to detect others, or comprising the various predisposing circumstances in our pathological estimate. Every influence or occasion ought to be recognised and duly weighed; for upon the evidence we obtain of each, must a principal part of our indications of cure be founded.

63. IV. TREATMENT OF IRRITATION. — The *indications*, as well as the *means*, of cure or of alleviation, of both local and general irritation, must entirely depend upon the knowledge that is obtained of the causes, of their individual and conjoint influence in producing the existing effect, and of the extent of functional or structural disease which has already resulted. It is manifest from these and other considerations, that the indications and means of cure of irritation must, in order to be appropriate and beneficial, have strict reference to the several predisposing and exciting causes, and

to the existing morbid conditions of each case. However closely observant, however experienced the writer may be, he cannot state these so as to apply to all the circumstances of such cases as they are daily occurring in practice. He can only assign those which are the most important and the most applicable to the more usual occurrences, leaving the reader to modify them, or even to add to them, according to the emergencies or the variations presented by particular instances.

64. There is no class of diseases in which the *fundamental principle* in therapeutics, of *avoiding or removing, subduing or counteracting, the causes,* is so necessary to be observed, or so difficult to be practised, as in this very important and numerous class; and none which requires greater physiological knowledge, or a more sagacious recognition of healthy and morbid sympathies as this does. Thus impressed, I have been led into a fuller exposition of the pathological relations and causes of irritation than may appear necessary to many. It seems, however, that this procedure was not the less necessary, that it was difficult, and either avoided by nearly all preceding writers, or treated of in a most empirical manner, or at least with a less strict reference to the early, the intimate, and the consecutive changes characterizing the diseased condition in question, — with a less regard to the actual procession of morbid phenomena, than the existing state of physiological knowledge warranted. In entering, therefore, upon the treatment of a case of local or constitutional irritation, it is necessary not only to ascertain fully, and to estimate justly, the predisposing and exciting causes, with the view of removing, or counteracting them; but also to trace the origin, the various relations, and the obvious and probable effects, of this condition, and to consider them in connection with the states of vascular action and purity, and of vital power or resistance, and with the *sympathies* existing between distinct organs and distant parts.

65. i. *Treatment of Irritation with reference to removing, subduing, and counteracting the Causes.*— Many of the causes admit of *removal*, others can be *counteracted* merely; and where the former cannot be accomplished, the latter must be attempted. In many cases, certain only of the causes may be removed, and the others may be either counteracted or subdued — a circumstance which should not be overlooked in framing our plan of cure. The *first part* of this indication requires no remark, but the *latter* demands further notice. In order to *subdue* or to *counteract* irritation, the *means* should be applied with strict reference to the *nature of the causes,* to the state of the œconomy, and to the *seat* and *state* of irritation. The *means* which are to be thus employed may be divided into *two classes.* 1st, Those which are strictly *local* or *topical;* and 2d, Those which act more or less *constitutionally,* or upon one or more of the general systems of the frame.

66. *A. Of the means applicable to the seat of Irritation.* — These consist chiefly of *emollients, anodynes* or *sedatives,* and *narcotics;* in some instances, of *refrigerants,* of *stimulants* or *irritants,* and of *evacuants.* The former of these admit of being variously combined. It is in comparatively few cases of irritation that these means can be applied to the part primarily affected; but where this may be done, it should never be neglected. — *a.* Under the head *emollients* may be comprized all the modes of employing *moist heat,* or of conjoining moderate warmth with humidity, as the use of fomentations, warm vapour, and poultices. — *b. Anodynes* and *narcotics* are indicated chiefly *in connection with the former,* the particular agent being suggested by the nature of the cause and the seat of affection. This combination exerts a more *sedative* influence on the local disorder than either would if employed singly. Thus, warm water, vapour, fomentations or poultices, with henbane, conium, belladonna, poppies, camphor, &c., are more efficacious than those emollients used simply. It should not be overlooked, that protection from the action of the air aids many of these in their beneficial operation. — *c. Refrigerants* are much less efficacious than the foregoing in removing local irritation, although they act, like them, chiefly upon the sensibility of the part; and, in order to be useful, they should be constantly applied. Refrigerants are most beneficial when irritation is about to excite either hæmorrhage or inflammation, and they may then especially be conjoined with various *astringents* and *sedatives,* as the preparations of lead, of zinc, of opium, &c.

67. *d. Stimulants,* or even *irritants,* are sometimes useful in subduing local irritation, but it is often difficult to determine the particular circumstances in which they should be resorted to. When the irritating cause is of a poisonous, septic, infectious, or contaminating or specific nature, then stimulants, or even the more powerful irritants, are generally beneficial. Thus camphor, ammonia, the turpentines, the chlorides, the nitrate of silver, and numerous other vegetable and mineral substances are often of service, when applied to a part irritated by any of these causes. In such cases, the artificial irritant, if sufficiently energetic, supersedes the action of the morbid one, especially if it be employed before the organization of the part and the vital powers have suffered, or before morbid sympathies have been developed; and even in these circumstances they may greatly aid the constitutional means of cure. The stimulus, even of *dry heat,* may be useful in relieving irritation when judiciously employed, or conjoined with other agents. When heat is indicated purely as a stimulant, or even as an antispasmodic and sedative, these will often be most useful when applied in a dry form. The combination of stimulants with narcotics is sometimes of use, even *locally,* in many cases of irritation, attended by pain or spasm, and it will be seen in the sequel that this combination is still more beneficial when prescribed internally or constitutionally. In most cases of irritation manifested chiefly in the nervous systems, this combination is especially indicated, and is often not less efficacious when topically than when constitutionally employed.

68. *e. Evacuation* of the vessels of the part affected, or of fluid effused in the areolæ of the tissue, is often of great service in an advanced period of irritation. In such cases, distension of the capillaries and of the tissues by the effused fluid, consequent upon the action of the irritant, perpetuates the morbid state, or even increases it; and in every instance it heightens the constitutional and sympathetic effects of the local affection. This is more particularly remarkable where joints, fibrous or serofibrous structures, or deep-seated parts, or tissues

bound down by aponeuroses, are so irritated as to give rise to capillary distension, or serous effusion. In cases of this description especially, the use of emollients, anodynes, and narcotics will often beneficially follow the judicious local evacuation of the distended vessels, or of the effused serum.

69. *B. The constitutional or more general treatment of irritation* consists chiefly of the use, — 1st, of agents calculated to lower or subdue, not only the local affection, but also its sympathetic and constitutional effects, by their direct or specific operation; — 2d, of such means as will excite irritation in a particular part or viscus, and thereby supersede or reduce the primary affection; — 3d, of those medicines which stimulate, or impart tone to, the nervous and vascular systems, and thereby either subdue the local morbid condition, or enable the constitutional powers to resist it, until it subsides either naturally, or from the disappearance of its causes, or from the influence of local treatment; — and 4th, of remedies which remove injurious materials from the system, which promote the excretions, and preserve the circulating fluids in a state of purity. — It is obvious that, in the more severe and intense states of irritation especially, these several means require to be variously conjoined, and to be aided by the topical measures already advised.

70. *a. The means most useful in reducing local, or sympathetic and constitutional irritation*, are the usual antiphlogistic remedies; as low diet, abstinence, vascular depletions, refrigerants, sedatives, and physical and moral quietude. These are more particularly indicated when irritation affects the sanguine, the plethoric, and the robust, or when it has superinduced a state of sub-inflammation, or of active congestion, or of active hæmorrhage, or of simple sanguineous determination to an important viscus. In opposite circumstances, especially in the debilitated; in the nervous, melancholic, lymphatic, and irritable temperaments; in persons with a poor, or deficient or morbid state of the blood; and for those who have long suffered, or who are suffering, from depressing influences, the lowering measures now enumerated generally increase the local irritation, and even hasten and augment its sympathetic and constitutional effects. By lowering the constitutional powers, resistance to the extension of the disorder is equally weakened. In cases of this kind, the more restorative measures about to be noticed (§ 76.) are required. Where the remedies comprised under this head are indicated, the choice of them must altogether depend upon the causes and nature of the case; but generally they should be cautiously prescribed, and they should be neither repeated nor persisted in, even when indicated, without being combined with narcotics, or with antispasmodics, according as morbid sensibility or spasm may be the consequence of irritation. In cases where want of sleep, or mental irritation, attends this affection, the state of circulation in the head should receive attention; and if these symptoms are clearly not referable to increased vascular action in this quarter, then narcotics or anodynes, sometimes conjoined with alkalies, are of great service, and reduce both the local irritation and the nervous affections consequent upon it. In cases of spasm, as well as of morbid sensation, anodynes and narcotics are nearly equally serviceable; but, in the former especially, a combination of them with those stimulants, commonly called antispasmodics, is productive of great benefit. When these symptoms are violent, without vascular determination to the brain, antiphlogistic and lowering means are generally prejudicial, the opposite measures about to be noticed being the more appropriate. In the circumstances just noticed, a recourse to alkalies or their sub-carbonates, with anodynes, is often of service, particularly when the urine is thick, deposits a sediment, is acid, and when the stools are offensive, and the skin foul.

71. *b. Irritation artificially produced in an organ or part remote from the primary seat of morbid irritation*, sometimes supersedes this latter state. The principle of *counter-irritation* — of *vascular derivation* — of *artificial irritation*, &c., has been long recognised in medical practice, has been variously denominated, and various means have been used in carrying the principle into effect. It is, when judiciously prescribed, more serviceable in disorders of irritation than in any other class. The agents employed with this intention may be divided into, 1st, Those which *irritate internal organs*, and are serviceable in consequence chiefly of this mode of action. 2d, Those that are *applied externally with this intention*. — *a.* Of the *former*, (*a*) *drastic purgatives* are the most commonly used, and sometimes most beneficial. They not only give rise to an amount of irritation occasionally sufficient to supersede the original affection; but they evacuate accumulated morbid secretions or fæcal matters, which either predisposed to, or otherwise contributed to cause the disorder. Their good effects may partly, also, be imputed to the vascular determination to the digestive canal and consequent derivation from the seat of irritation produced by them. It is principally, however, when disorder is seated in parts intimately sympathising with the intestinal canal, that they are the most useful. If it is seated in the nervous centres, or if it affects sensation or muscular motion, cathartics energetically employed afford great relief, as shown in the articles on Neuralgic Affections, Tetanus, &c. — (*b*) *Emetics* are, upon the whole, less serviceable than cathartics; yet they are of much use for irritation of the respiratory organs, especially for hooping cough, asthma, croup, and for all spasmodic affections of the larynx and bronchi consequent upon irritation of the nerves of these parts. Of cathartics and emetics, it may be remarked, that a cautious recourse to them, — in some cases a frequent repetition of them, — is often necessary to the removal of the irritation produced by morbid secretions accumulated in the gall-ducts and bladder, or even in the cells of the colon, or in the cæcum. — (*c*) The more *irritating diuretics*, as turpentine, cantharides, &c., are sometimes decidedly beneficial in many disorders of irritation; and according to my experience, they are most so when the irritation gives rise to spasmodic or convulsive actions, as in trismus, convulsions, hooping cough, &c.; but in order to be thus useful, they should be given so as to produce a marked operation on the urinary passages. I have frequently seen a very manifest improvement of states of these diseases as soon as the urinary organs became irritated. — (*d*) *Salivation* may be considered as one of the modes of internal irritation and derivation, espe-

cially when maintained for a considerable period. Mercurial salivation is, however, more appropriate to inflammatory diseases than to disorders depending upon irritation, unless indeed the latter tend to the former character, and affect the states of vascular action either generally or locally. Irritation also, when productive of hæmorrhage, is often most successfully combatted by mercurial salivation, of a slight form, when it may be readily produced, and without having recourse to a too free exhibition of this mineral. In the slightest forms of irritation, especially those affecting parts about the face, mouth, &c., artificial excitement of the salivary glands by pyrethrum or other sialogogues may be of use.

72. *B. External derivation or irritation* has always been prescribed for disease; but, in recent times, it has been resorted to by empirics and impostors, who have employed it injudiciously and often injuriously. It is appropriate in most cases of irritation in some form and mode or other; yet much discrimination is necessary to a beneficial recourse to it, in the choice both of the irritant and of the situation to which it should be applied. The stage of the disorder, in which it is most likely to be serviceable, and the other means of cure which should be prescribed in aid of it, also deserve consideration. In the more acute and continued cases of disorder, and when it is desirable to produce an immediate effect, then the external irritants which are most energetic, as hot turpentine epithems and embrocations, mustard poultices, blisters, moxas, stinging by nettles, mustard pediluvia, &c., are also the most useful; but, in the more chronic, remittent or intermittent states, it will be necessary either to repeat these applications oftener than once, or to have recourse to others which, although slower in their operation, are more permanent in their influence on the complaint, as setons, issues, and artificial eruptions produced by croton oil, by tartar emetic ointment, or by other means. Some of these modes of producing external irritation require a few remarks.

73. *a. Epithems* of warm flannels soaked in spirits of turpentine, produce an almost immediate redness and a burning sensation of the part on which they are applied, and are especially beneficial in irritation of internal organs, in painful or spasmodic affections, and particularly when there is risk of inflammatory action or hæmorrhage being induced. They may be frequently repeated in some cases, and they then usually slightly vesicate or excoriate the surface of the part, the external inflammation thus produced soon subsiding, and they often procure a copious perspiration.—*Stinging by nettles* was formerly much used, and is an immediate and often very efficacious mode of external derivation; and is applicable to the cases for which mustard poultices are prescribed.—Mustard *pediluvia*, or mustard *manuluvia*, the water being as warm as it may be endured, and *mustard poultices*, are of service chiefly in cases of slight irritation, and before vascular excitement has been produced, or after it has been in great measure subdued. These means are seldom of much service when vascular excitement is considerable.

74. *b.* The external irritants which are slow in their action, are beneficial in consequence rather of their permanent influence, and the discharge they occasion, than of the amount of irritation or inflammatory action produced by them. This is especially the case with *setons* and *issues*, in all the various forms in which they are made or kept in action. One of the best modes of forming an issue is by applying the decorticated bark of mezereon, previously moistened, over the part selected, and by renewing the application daily, or by placing the common issue-peas under the plaster covering the denuded or ulcerated part. When it is desirable to produce a free discharge and much artificial irritation at the same time, then *open blisters, large issues*, or the *antimonial ointment*, may be prescribed. *Croton oil*, employed so as to occasion free pustulation, and other applications calculated to excoriate the surface and to give rise to a free discharge from it, as various combinations of concentrated acetic acid and oil of turpentine, or preparations of ammonia, are severally of use when judiciously prescribed and applied, and when aided by appropriate internal means.

75. *c.* Most of these modes of producing external irritation and derivation from the primary seat of disorder are *indicated*, either before vascular action has been excited by the primary affection, or after it has been subdued, or in a great measure subdued by suitable treatment. As long as inflammatory action exists, or as long as the primary irritation may be greater than the amount of external irritation that can be prudently excited, but little benefit will result from the practice unless the discharge procured by its means assist its influence, or compensate for the deficiency in the amount of irritation. In such instances the artificial irritation is seldom productive of that amount of vascular afflux or determination capable of being decidedly beneficial. When, however, a copious discharge is produced and maintained, the internal affection will often be removed, if it does not amount to disorganization or serious structural change; but when these changes have taken place, the amount of discharge will often only hasten the unfavourable progress of the malady, and sink the patient. In all such cases it is important to watch carefully the effects of this mode of treatment. When morbid irritation has given rise to increased vascular excitement, external irritation and derivation are seldom successfully procured. In these cases they only augment the morbid vascular action, and are prejudicial, or at least inefficacious, in proportion to the degree in which the vascular system is excited.

76. *C. The remedies which stimulate the nervous energy and impart tone to the vascular system*,—*a*, are generally of service in diseases of irritation when the vascular system is not materially disturbed, or when it is excited to increased action, with a diminution of power, and with evidence of a morbid state of the blood. When irritation has been followed by great frequency of the heart's action, irritability and muscular power being much impaired, and the pulse soft and open, or expansive, then the more energetic stimulants or tonics, selected with reference to the circumstances of individual cases, and conjoined with means which may promote the action of the emunctories, and counteract morbid changes in the circulating fluids, are generally of the greatest service. They increase the vital resistance to the extension of the sympathetic effects of irritation, and enable the vital energies to overcome the

primary morbid condition, or to resist its injurious influence until it subsides under the local or other means of cure, or from other influences. The several preparations of cinchona, or of other tonic barks, quinine, camphor, ammonia, the chlorate of potash, the chlorides, the alkaline carbonates, the hydro-chloric acid and ether, wine, opium, alcoholic preparations, the turpentines, Cayenne pepper, cajeput oil, &c., and the numerous remedies more particularly mentioned in the *Treatment of* Typhoid Fevers (§ 530.) and of Diffusive Inflammations (§ 236.), are more especially indicated in this state of disease.

77. *b.* When irritation gives rise to *extreme pain*—to the more violent forms of neuralgia, or to *convulsive* or *spasmodic actions*, the most energetic and permanent tonics, variously combined, according to the states of the excreting viscera, are also then more beneficial than a lowering treatment; but these remedies should be aided by the most active narcotics, and by suitable local means. In such cases, brisk cathartics, followed by quinine, or the preparations of iron, or of arsenic, camphor, the alkalies, or alkaline carbonates in large doses, ammonia, &c.; and these aided by opium, morphia, henbane, colchicum, aconite, &c.; prescribed either internally or externally, or endermically, according to circumstances, are the most efficacious remedies, particularly when judiciously combined with one another, or with other medicines. Whenever pain or convulsion is violent, inflammation is not present; but the irritating cause evidently acts most energetically upon the nervous system; and the means employed to overcome or remove it should be equally energetic, and so selected and combined as to act upon the source and seat of irritation, and to remove the morbid impression made by the cause of it. In some cases particularly those of extreme pain, always affecting the same nerve, treatment is not permanently efficacious, although it is generally of temporary service, because the affection depends upon mechanical or irremoveable irritation, near the origin or in the course of the nerve. In severe cases of spasm, or of convulsion, it is, upon the whole, not much more successful; and is even almost equally hopeless when the complaint depends upon similar causes, or upon structural changes in the head, or spinal column. In all such cases, the means of cure should not be too weakening, and sanguineous evacuation should be cautiously practised, even although local plethora, or vascular determination to the nervous centres, may exist. Local depletions, or small bleedings, counter-irritation and derivation, both internal and external, tonics, anti-spasmodics, narcotics, &c. are more beneficial than other measures. Some years since, a gentleman was sent to me from the country by his medical adviser on account of neuralgia of the occipital nerves; I considered it, from the history of the case, to be dependent on a permanent cause of irritation about the base of the skull. External derivation, and the other means already advised, were prescribed, and he continued to improve for two or three years. During a visit to town, he was exposed to several sources of disorder, and in the evening he was seized with violent convulsions. The surgeon called to him bled him to a very large amount; and on the following day when I saw him, his pulse was very quick, irritable, extremely compressible, and furnishing all the indications of much excitement, with defect of power. His manner and answers to questions were hurried, quick, and unusual. I expected a return of the seizure, or paralysis, or apoplexy, in the course of a few days; but he continued to improve slightly for some months, when hemiplegia, followed by apoplexy, soon terminating life, took place. Numerous other illustrations of this principle might be adduced, if my limits could admit of them.

78. *D. Remedies which remove injurious matters, promote excretion, and correct morbid states of the blood.*—Many of the substances that evacuate excrementitial irritating matters also exert a salutary derivation, as respects the vascular afflux or determination. The old doctrine, "ubi irritatio ibi fluxus," is correct in all situations, and in every sense; and particularly when the irritant is applied to mucous surfaces, and acts upon excreting glands. During many states of irritation, particularly when vascular action is materially excited by it, absorption is remarkably active, and morbid secretions accumulated either in the biliary passages, or in the intestines, especially in the cells of the colon and cæcum, are more rapidly, than in other circumstances, conveyed into the circulation, thereby either favouring the production of, or actually producing, constitutional disturbance of a serious nature consecutively upon the local irritation. The more stomachic, tonic, and alterative purgatives are essentially necessary in such circumstances, particularly combinations of the compound infusions of gentian and senna, with alkaline carbonates; the spirits of turpentine, with or without castor oil; and other medicines which produce a restorative, as well as an evacuant effect. In all instances of impaired excretion, or of excrementitial accumulations in the circulating fluids, either contemporaneous with, or consequent upon, local or constitutional irritation, the exhibition of stomachic purgatives, and the alternation of the more powerful tonics, are extremely serviceable. In this state of actual disease, the chlorate of potash, the chlorides, hydrochloric æther, camphor, ammonia, the alkaline carbonates, and, when vascular action is excited, the nitrate of potash, the solution of the acetate of ammonia, and other stimulants, either separately, or preferably in conjunction with quinine, or with tonic infusions or decoctions, or with one another, according to their several compatibilities, will be found most beneficial, provided that the actions of the emunctories be at the same time duly promoted, and morbid accumulations evacuated. In cases where irritation is attended by accumulations of excrementitial matters in the blood, not only should the bowels be freely acted upon by the means just mentioned, but the kidneys ought to be excited by the more energetic diuretics, as the turpentines, the alkaline carbonates, the nitric or hydro-chloric æthers, &c. When local, or even constitutional irritation, is attended by deficiency of blood, or by a deficient proportion of hæmatosine, then the preparations of *iron*, with alkaline solutions, as the mistura ferri composita, or the ferri ammonio-chloridium, the ferri potassio-tartras, &c. will be requisite, in addition to the other means which the circumstances of individual cases will suggest.

79. *E. Alteratives* and *deobstruents*, either

alone, or conjoined with gentle restoratives, or with mild tonics, or with laxatives or aperients, are of the greatest service in the more chronic and slight forms of irritation. The most useful of these are Plummer's Pill, either alone or with soap and extract of taraxacum; the hydrargyrum cum creta, similarly prescribed; the liquor potassæ, or Brandish's alkaline solution, with any of the concentrated preparations of sarsaparilla, or with taraxacum; and the solution of potash, with the hydriodate of potash. The sub-borate of soda, either alone or with the bitartrate of potash, or both these with taraxacum, are of service for irritations of the biliary organs. A combination of several of the foregoing medicines with camphor, henbane, belladonna, or conium, or with any of the preparations of opium, according to the peculiarities of particular cases, is often beneficial, especially when irritation is attended by increased sensibility. When there is much irritation of the cutaneous surface, the alkalies and their carbonates, camphor, prussic acid, the narcotics just enumerated, with emollients, &c., employed both internally and externally, should never be overlooked.

80. *F. The diet and regimen* of diseases of irritation require much attention. Whilst vascular action continues excited, the *diet* should be mucilaginous, or farinaceous; light and cooling, and suited to the powers of digestion and assimilation. If, however, the vascular system be not materially affected, and the functions of the stomach are not much impaired, a small proportion of light animal food may be allowed. In the more serious states of constitutional irritation, especially where there is marked asthenia, and a disposition to changes in the state of the blood, wine and even alcoholic stimulants are often necessary, in aid of the means above recommended, in order to limit, or to prevent the extension of the mischief, by exciting the several vital endowments. In these cases, the diet should consist chiefly of such articles as are desired or relished by the patient, as being the most likely to be digested without disordering the system.

81. Change of *air:* residence in a pure air, exercise taken regularly and short of fatigue, travelling, the use of those *mineral waters*, both internally and externally, that contain the alkalies and alkaline carbonates and carbonic acid; the waters of Bath, Ems, &c., are usually beneficial; but mineral springs should be prescribed with a strict reference to the specific forms of these complaints, after a due experience of their operation, and without being influenced by prejudices, by fashion, by guide-books, or by local interests. In many diseases of irritation, the factitious mineral waters prepared at Brighton have proved of great benefit, even in the range of my own experience, having frequently prescribed them since 1824. In most cases, however, much discrimination is requisite to the procuring all the benefits they are calculated to afford. In most instances, the milder waters, as those of Ems, of Saratoga, or of Salzbrunnen, should be first prescribed; and subsequently the more tonic waters of Kissengen, Marienbad and Carlsbad, or of Eger, Pyrmont, or Spa, having recourse occasionally to the waters of Seidschutz or Pulna, when the bowels are torpid, or the biliary functions impaired or obstructed. Several of these waters, also, may be procured in London; and at Brighton their effects may be aided, in the cases that require it, by warm salt-water bathing.

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ISCHURIA. *See* URINE.

ITCH.

— Syn. *Psora*, Ψώρα (from Ψαω, I rub or scratch), *Scabies* (from scabo, I scratch). *Phlysis scabies*, Young. *Ecpyesis scabies*, Good. *Scabiola*, Auct., Lat. *Krütze, jucken der haut, zaude*, Germ. *Gale, rogne*, Fr. *Rogna, Scabbia*, Ital. *The Scab.*

Classif. — iv. *Class*, viii. *Order*, (*Cullen*). 6th *Class*. 3. *Order*, (*Good*). III. Class, I. Order (*Author* in *Preface*).

1. Defin. — *An eruption of distinct, slightly acuminated vesicles, accompanied with constant itching, caused by contagion, the eruption being occasionally modified in character at its appearance, or during its progress, and unattended by constitutional disturbance.*

2. Recent writers have supposed that the eruption mentioned by Galen, under the name of Ψώρα, was really the itch; but his description of it is more applicable to squamous than to vesicular eruptions. The description also which Celsus has given of *scabies* is by no means distinctive of itch, and is more characteristic of prurigo than of it. Neither these writers nor Avicenna mention contagion as attending the eruption thus named by them. Guy de Chauliac, according to Rayer, was the first to point out this important feature of the disease. Subsequent writers have generally noticed it, although several of them have not distinguished between itch and prurigenous affections. More recently Willan, Bateman, Biett, and Rayer, have given the history of this eruption with much precision.

3. The modifications occasionally presented by the itch, both on its appearance and during its progress, have led to some difference in the classification of it. Thus it sometimes assumes from its commencement a *papular* form, and during its course a *pustular* character. Hence Willan and Bateman arranged its varieties accordingly

and placed it among the *pustular eruptions*, the varieties being the *Papuliformis*, *Lymphatica*, *Purulanta*, and *Cachetica*. MM. Biett and Rayer, however, have more accurately classed it with *vesicular eruptions*, the vesicular form being its primitive and most common state; still it sometimes appears as a *papular eruption*, and as such Dr. Paget has arranged it. I shall here consider the disease as *commonly vesicular*, and the *modifications* orv *arieties* presented by it as accidental or contingent upon the peculiarities or circumstances of individual cases.

I. Description. — This eruption generally appears first on the hands, between the fingers, on the wrists, on the flexures of the joints, on the abdomen, and on the insides of the limbs. It is most commonly confined to a surface of no very great extent; and, in some cases, consists only of a few vesicles dispersed between the fingers and over the wrists; but it may affect the skin very generally. It does not occur on the face or on the scalp. It is essentially a contagious disease, and is neither epidemic nor endemic.

4. 1st, *Of its common vesicular form.* — The eruption generally takes place in *children* at the end of four or five days from the period of contagion; but this is uncertain, for in weak or delicate children it may be delayed beyond this period, whilst, in the plethoric and sanguine, it appears even earlier. It seldom occurs in *adults* before eight or ten days have elapsed, in spring and summer, or before fourteen or twenty days in winter. It is longer in appearing in the aged than in the young or middle-aged, and it attacks in preference the situations where the skin is most delicate.

5. The eruption commences with itching, at first slight, of the parts which have been exposed to contagion. The itching is increased through the night by the warmth of the bed, by indulgence in stimulating food, beverages, and spices, and by whatever heats or determines the blood to the surface. A number of small points or spots, very slightly elevated above the surface, now appear, and present a pale rosy colour, with small acuminated vesicles on each point or spot. If the vesicles be few, they occasion but little puritus, and preserve longer their primitive form; but if they be numerous, the skin between each participates in the irritation, and the itching becomes urgent. The vesicles are then usually torn by the nails, and allow their viscid serous contents to escape, which concrete and form small thin scabs, slightly adherent to the skin. If the scratching has been violent, the scabs are black, and resemble those of prurigo.

6. ii. *Varieties or modifications.* — Owing to peculiarity of constitution, to the amount of inflammatory action attending the eruption, to the depth to which it extends in the tissues composing the skin, and to the existing state of health of the patient, itch presents certain modifications which have been arranged into species by Willan and Bateman. — *A.* The variety denominated by them the *Scabies Papuliformis*, or *rank itch*, is that in which the eruption is more papular and inflamed at the base, but still presents a transparent apex, indicating its vesicular character. When much irritated by scratching, long red lines are left here and there, and the fluid exuded from the abraded vesicles concretes into little brown or blackish scabs. In sanguine temperaments, and when much irritated, a few of the vesicles assume a pustular form, from the fluid contained in them changing to a purulent matter.

7. *B.* The *Scabies Lymphatica*, or *watery itch*, differs from the foregoing chiefly in the absence of the papular character and of inflammatory redness, and in the larger size of the vesicles. When the vesicles are ruptured by scratching them, moist excoriations often form, and, after a time, dark scabs. This variety usually presents three stages; viz. the entire vesicle, the excoriation consequent on its rupture, and the scab covering the excoriated part. It is not so frequently observed as the former variety on the trunk, but is most commonly found collected on the lower parts of the extremities, as the fingers, wrists, backs of the hands, and sometimes on the feet and toes.

8. *C.* The *Scabies Purulenta*, or *pocky itch*, is more distinct than the other varieties. The round pustules into which scabies, in a few instances, forms itself, resemble the pustules of small-pox. They occur chiefly in children and young persons, who have been living on a heating diet, and who have been inattentive to cleanliness. These pustules are distinct, with an inflamed base, and considerably elevated; they maturate and break after a few days, having then often attained a diameter of two or three lines. The itching occasioned by them is attended by more tension and smarting than that of the other varieties. After they break they often leave a cracked excoriation or ulceration behind, or small fissures between the scabs, the stiffness and heat of which cause considerable uneasiness. The pustules rarely appear on the trunk; but usually on the hands, between the fingers, or near their flexures, more rarely on the feet and at the bends of the arms. They are largest on the hands and between the knuckles, especially between the index finger and thumb; they often coalesce, and in these situations more especially, slight fissures or cracks form in the concretions covering the excoriations or seats of pustulation. This variety, in plethoric children, is sometimes attended by slight febrile commotion.

9. *D.* The *Scabies Cachectica*, or *scorbutic itch* of Willan, is not, strictly, a variety, but merely an imprecise modification, produced by debility and general cachectica, inconsequence of intemperance, poor living, and unwholesome food, that assumes no very distinct or unvarying character. As may be expected, from the circumstances in which it occurs, it is the most aggravated state of the eruption; and is more frequently than the true varieties, either form of which it may assume, *complicated* with other eruptions, particularly with *lichen*, *prurigo*, *ecthyma*, and *impetigo*. When itch occurs in the *dark races*, it generally presents this state, and is severe and obstinate — is *rank* and extensive, spreading rapidly over the body. As thus met with, it has been noticed by Bontius, and by Sauvages, who called it *Scabies Indica*.

10. *E. The Complications of itch* often render the diagnosis difficult. *Ecthyma* is sometimes associated with it, and more rarely *eczema*, but is chiefly cured by the use of stimulating washes or ointments. Scabies is most frequently complicated with *papular eruptions*, particularly with *lichen*, in

the young, and when the vesicles are generally or abundantly disseminated. *Prurigo* is often associated with itch in the more prolonged cases. *Boils* occasionally appear in the more severe instances. These complications, as well as a pustular state of the eruption, are favoured by living on salt, acrid, and fat meats, and by acrid applications to the surface. Disorders of the digestive organs sometimes prevent the full evolution of itch; or persons subject to these disorders, who have caught this affection, often readily recover from it, when such disorders are aggravated by errors of diet. *Scrofula* does not materially modify scabies. In very unhealthy or cachectic subjects, it sometimes assumes a livid hue; and, when its vesicles are crowded in any part, they are occasionally associated with *ecthyma cachecticum.*

11. *F.* The *duration* of this eruption depends upon treatment. If left to itself it never gets well; and may even continue through life when thus neglected. In southern climates, and in spring and summer, and in young, plethoric, and robust persons, the vesicles of itch run rapidly through their successive changes when not broken by scratching; but their progress is much slower in the north, in winter and autumn, and in the bilious, melancholic, and cachectic, and in the aged and infirm,—in whom, also, it is longer in appearing after infection. When it is judiciously treated, and with strict attention to cleanliness and to the state of the linen and clothes, it may be cured, in very recent cases, in five or six days, and in the worst cases, in from ten to fourteen days to three weeks; but it may be protracted beyond this period, in the old, infirm, and cachectic; or when it has been long in appearing. In some rare instances, it disappears on an attack of an internal inflammatory disease, and returns again when that disease is removed. This circumstance, however, has been doubted, some other eruption having been mistaken for the itch. In general this eruption exerts no influence upon internal complaints, nor do they produce any effect on it; although an opposite opinion has been long held by pathologists, and is still entertained by a few.

12. II. DIAGNOSIS. It is of importance, not only as respects the reputation of the practitioner, but as regards the speedy recovery of the patient, and the protection of the other members of the family to which he belongs, that a correct diagnosis between this eruption and those which so closely resemble it should be made.—*A. Prurigo* is most frequently confounded with the itch; but, independently of the former being papular, whilst the latter is vesicular, prurigo is usually seated on the back, shoulders, and on the outsides of the limbs, or on the surfaces of extension; whilst the itch is observed chiefly on those of flexion, on the wrists, and between the fingers. Prurigo, also, occurs more frequently in adults and elderly persons than itch, its papula are flat, and when abraded, a black spot of blood concretes on their centres. The itching attending prurigo is more vehement than that of scabies, more stinging or smarting, and less pleasurable. The former, also, is not contagious.

13. *B. Lichen simplex* most closely resembles the papuliform variety of itch. In the former no vesicles can be detected in the summits of the papulæ, which pass away in a scurvy exfoliation; and do not give rise to dark scabs. Lichen appears on the backs of the hands and on the external surface of the limbs, and hardly ever between the fingers. The itching attending it is not severe, and the papulæ preserve the tint of the skin, whilst the vesicles of scabies are of a pale pink; the former being generally crowded together, the latter being much more distinct. Lichen is commonly accompanied with some constitutional disturbance; but it is not contagious. The *lichen urticatus* is more acute, and sometimes presents a few vesicles among the papulæ; but its inflamed wheal-like papulæ, and the deep tingling rather than itching, sufficiently distinguish it.

14. *C. Eczema*, particularly *C. Simplex*, may be confounded with itch; but in the former the vesicles are flattened and agglomerated in greater or less numbers, whilst in the latter they are acuminated and generally distinct. The itching of eczema is a kind of general smarting, or stinging, very different from those exacerbations characterising itch. The former is usually produced by exciting or irritating causes, the latter by contagion only.

15. The association of scabies with other eruptions is of importance in the diagnosis. Such complications may be merely accidental, but they occasionally arise from the irritation of scratching, and of applications to the eruption. Vesicles of itch, pustules of impetigo or of ecthyma, and furunculi are sometimes met with in the same patient. The papulæ of Lichen also may be either contemporaneous with itch, or consequent upon it. Scabies may even coexist with syphilis, without having its characters thereby modified, further than has been noticed when mentioning the variety called cachectica. These combinations generally retard the cure, as well as often increase the difficulty of diagnosis.

16. III. CAUSES. The great, and perhaps only, cause of itch is contagion. The only questions are, whether it does, in any circumstances, arise spontaneously, and what is the nature of the infecting substance or body? These will be answered in the sequel, as far as the state of our knowledge admits of answers. Scabies is one of the most universally disseminated contagious diseases, the momentary contact of the fluid secreted by its vesicles being sufficient to communicate the infection. It occurs in every climate, in every season, in all ranks and ages; but is most common in the poor and wretched, in persons negligent of cleanliness; in sailors, soldiers, in work-people, dealers in old clothes, in tailors; and especially in those crowded in jails, hulks, barracks, workhouses, and factories. It rarely is observed in tanners, in dyers, and blacksmiths, or in the families of the affluent. It always spreads in consequence of contact, immediate or mediate; and of want of cleanliness.

17. Several instances of itch transmitted from animals to the human species have been cited; but most of the diseases thus named are inaccurately described, and are of a very doubtful character. M. MOURONVAL adduces cases of the communication of itch from the dog to man; but M. RAYER states that M. LEBLANC showed MM. SABATIER, LITTRÈ, and himself, dogs labouring under a disease called itch, consisting of a number of small acuminated vesicles, resembling those of scabies in the human subject; and stated that the man who attended them had not been infected by them, although they communicated the disease

to their own species. This however is no satisfactory proof of the non-communicability of the affection from the dog to man. Mr. Youatt, whose authority in this matter is the best possible, informed the author that the itch may be communicated to the dog, and by the dog to man and other animals, but that it is never sporadic in the canine race.

18. Avenzoar, and long subsequently Ingrassias and Jobert, hinted at the existence of an *insect* in the vesicles of itch: but Mouffet first mentioned it in his *Theatrum Insectorum*, in a particular manner. Several recent authors have described it under the name of *Acarus scabiei.* Hauptmann first published a figure of it, and represented it with six feet. Redi put the existence of this insect beyond doubt, and, aided by G. Lorenzo and H. Cestoni, examined numbers of them, having removed them from the vesicles. Dr. Bonomo gave the following description of it. This insect moves with great vivacity; has six legs, and a pointed head, armed with two small horns or antennæ at the extremity of the mouth. It is, he remarks, difficult to distinguish these insects on the surface of the body, owing to their minuteness and to their colour resembling that of the skin. They first insinuate their pointed heads, and then move about gnawing and pushing until they have buried themselves under the cuticle, where they form a kind of covered way of communication between one point and another, so that the same insect generally causes several watery pustules. The above physicians also discovered the eggs of these insects, and even observed their extrusion from the hinder part of the animal. The eggs are white, nearly quite transparent, and hardly visible. These insects, they remark, pass readily from one person to another by mere contact, for being very active, and often on the surface of the skin, they readily attach themselves to whatever they touch.

19. Morgagni, Linnæus, De Geer, Wichmann, Waltz, and others confirm the above description; but, nevertheless, the existence of these insects having been called in question, M. Galés took up the subject, and his investigations, which were witnessed by many members of the Institute, further confirmed the above statement. The circumstance of Galeotti, Chiarugi, Biett, Lugol, and Mouronval having failed in finding these insects, occasioned fresh doubts of their existence; but their failure arose from having sought for them in the vesicles. Mouffet had long before stated that they are not found in the pustules, but by their sides; Casal had made nearly a similar observation; and Dr. Adams remarks that they are not found in the vesicle, but in a reddish line going off from one of its sides, and in the reddish and firm elevation at the extremity of this line, and at a little distance from the vesicle. Mr. Plumbe supposes that the insect is unable to live in the fluid of the vesicle, which is the result of the irritation it causes, and therefore escapes from it. Finally, M. Renucci, a medical student from Corsica, showed, in 1834, the physicians of Paris the mode of discovering this insect; which is the same as that formerly stated by Dr. Adams. Since this time, M. Rayer remarks, the existence of the *acarus* of the itch has been placed beyond a doubt. MM. Lemery, Gras, and Renucci had each shown him the mode of detecting it, and he had himself extracted several. M. Raspail has given an excellent description and figures of it; and M. A. Gras has entered into researches as to the share it has in producing this eruption. Although it has been proved that, in almost all who are affected with scabies, and who have not been subjected to treatment, a certain number of subepidermic furrows containing acari are to be discovered, it is also undoubted that the number of these furrows and of these insects bears no proportion to that of the vesicles. It is, further, rare to discover these insects on the abdomen and groins where the eruption is nevertheless very common and apparent; and, moreover, scabies is known to continue where no more acari are to be found. The experiments made to ascertain whether or not the *acarus* be the *cause* of the itch, or a parasite produced by it, are not altogether conclusive.

20. IV. Treatment. As the itch is never spontaneously cured, but may continue even for many years, the treatment should be decided and unremitting. The experiments lately made by M. Gras have thrown much light upon this subject. They prove that a concentrated solution of the *hydriodate of potash* kills the *acarus* of scabies in the shortest time — in from four to six minutes; and he considers that *an ointment, consisting of half a drachm of this substance to an ounce of axunge*, is the best remedy for the itch. I have prescribed this ointment in several instances, and have found it the most speedily efficacious. This physician states that the itch-insect lives sixteen hours in the vapour of burnt sulphur; three hours in water; two hours in olive oil; one hour in the acetate of lead; one hour in pulverised brimstone; three quarters of an hour in lime-water; twenty minutes in vinegar and spirits of wine, and twelve minutes in a solution of sulphuret of potash.

21. Where scabies is uncomplicated and recent, its cure is readily accomplished by local applications, and without any preparatory or constitutional means; but where it is of old standing, and associated with other eruptions, or with an inflammatory state of the skin, and particularly if the patient be young and plethoric, a bleeding from the arm, soothing lotions and simple baths may be premised. Frictions with the *sulphur ointment* (*sulph. sublim. loti* ℥viij. *adipis præp.* ℔j.), or with either of the *compound sulphur ointments* (*sulph. subl.* ʒij. *potassæ subcarb.* ʒj. *adipis* ℥j., or *sulphureti calcis* ʒj. *adipis* ℥j.), usually cure scabies in ten or fourteen days. The compound sulphur ointment is the next to the ointment with hydriodate of potass in efficacy. M. Rayer advises the compound sulphur ointment in the quantity of two ounces daily, to be rubbed over all the parts affected, the patient's skin having been well cleansed with soap and water. The rubbing should be continued diligently for about half an hour, morning, midday, and at night. If this be continued unremittingly, the eruption may be cured in six or seven days. Helmerich prescribed four ounces of the compound sulphur ointment to be assiduously rubbed on the parts affected in the twenty-four hours. An ointment, consisting of *sulph. sublim. loti* ℥iij., *ammon. hydro-chlor.* ʒij. *adipis præpar.* ℥xiij. is also an efficacious application. M. Derheims has found the solution of *chloride of lime*, ℥j. in water Oj., and used twice or thrice daily, very efficient.

22. The plan of M. Pyhorel, to add half a

drachm of the sulphuret of lime to a little olive oil, and with this to rub the palms of the hands during a quarter of an hour night and morning, is also efficacious. *Sulphureous washes*, as that composed of *potassæ sulphureti* ℥j., *aquæ* ℔ iij., of which an ounce is to be added to four ounces of warm water, and applied to the affected parts, also speedily effect a cure. These washes do not soil the clothes like ointments, but they often cause vesicular and papular eruptions. Should these eruptions appear or complicate the itch, irritating frictions and applications must be suspended, and tepid emollient baths prescribed. In all cases of scabies, a few tepid baths should follow the removal of the eruption.

23. *Alcoholic saponaceous washes, acid ointments and washes, artificial sulphureous baths, sulphureous fumigations*, &c., and various other means have been recommended for the cure of itch; but they are less certain than the above, require a longer period, and are more expensive. Washes and ointments, the basis of which are *nitric acid* and *mercury*, have occasionally produced salivation and disturbance of the digestive organs. The *internal use of sulphur*, or this conjoined with its external application, has been long employed in this country; and is efficacious and well suited to the purulent form of scabies, as met with in children. *Hellebore* and *tobacco* have also been recommended for the cure of itch, and are doubtless efficacious; but they are hazardous substances, particularly where there is much excoriation, and when prescribed for children.

24. Where itch is associated with general cachexia, and is modified by this circumstance, a judicious internal treatment should be conjoined with external applications, and with warm or tepid baths. In these cases the *liquor potassæ* may be taken with sarsaparilla, or the alkaline carbonates may be given with mild tonics; and an alterative dose of a mild mercurial may be prescribed occasionally at bedtime. This treatment, in addition to the specific external measures already mentioned, is also requisite when itch attacks the *dark races*, among whom it generally proves a much more severe and obstinate affection than in the white races.

25. During the treatment, the *diet* should be digestible and in moderate quantity. All acrid, heating, and fat articles, as well as stimulating beverages, should be avoided. In order to prevent a return of the eruption, and its spreading in a family, the body and bed-clothes of the patient ought to be subjected to disinfecting processes, as the fumes of sulphurous acid gas. The linen should be changed frequently, and the greatest attention paid to cleanliness.

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KIDNEYS. — The Diseases of. — 1. Our knowledge of the diseases of the kidneys has been recently very much advanced and rendered more precise by the researches of Drs. Bright, Prout, Christison, Gregory, Willis, Osborne, Rayer, and others. In the present article will be discussed the *diseases of which these organs are the only or principal seats*; and, in that devoted to the consideration of the *urine, those disorders in which the kidneys and other urinary organs are functionally disturbed*. The great importance of an early attention to the disorders, and more especially to the actual diseases, of these organs, especially in relation to several consecutive maladies, and to various pre-existing changes of the digestive and assimilative functions, and of the circulating fluids, has become very manifest since the researches of Dr. Bright disclosed to us some of the most interesting, most common, and most fatal, of the lesions, to which the kidneys are liable.

2. The causes of diseases of these organs do not for the most part act immediately upon them. Intimately associated with the digestive and assimilative viscera through the medium of the ganglial or organic nerves, with the circulating organs by the states of the blood, and with the cerebro-spinal nervous system, by means of the spinal nerves communicating with the renal ganglia and plexuses, the kidneys are liable to be deranged sympathetically, or indirectly, during the progress of the various disorders and maladies, by which these important parts of the human frame are affected. As the chief emunctories of effœte and hurtful materials, the ultimate product of assimilation, that are liable to accumulate in, and require to be carried out of, the circulating fluids, the kidneys are disturbed by the superabundance and peculiarities of these materials. Eliminating these various elements and substances existing in the blood circulating through them, by means of the nervous influence conferred on them, chiefly by the ganglia and plexuses which supply and endow them; and combining these elements into new forms, frequently of an irritating and hurtful nature, they are liable to disorder from causes which may diminish, excite, or otherwise modify this influence, or interrupt the excretion of the fluid and saline matters, that they are destined to accomplish. Intimately associated,

moreover, with the other organs eliminating from the circulating mass, materials of an irritating or otherwise hurtful tendency, they are liable to disorder, sometimes of a vicarious character, from causes acting upon the organs thus associated with them in function, although in other respects remotely connected with them, and from diseases affecting the organisation or functions of those parts: thus are the kidneys affected by causes acting upon the skin, lungs, liver, digestive canal, and generative organs; by diseases affecting the functions and organisation of those several viscera; and by morbid conditions of the system in general, or of the nervous and vascular systems in particular.

3. These are circumstances calculated to increase the difficulty of the study of the diseases of the kidneys; and it should not be concealed that there are causes which add to this difficulty. Amongst these, the low degree of sensibility with which the internal structure of these organs is endowed: their situation — protected in one direction by a firm and unyielding mass of muscles, &c., and surrounded in all the rest by various viscera; and the changes which their secretion undergoes in the parts through which it passes or accumulates, deserve due consideration; and should impress the mind of the physician with the importance of a diligent investigation of the phenomena, and of caution in forming his opinion as to the nature, of the affections referrible to these organs, as the only guides by which the *indications* and the *means* of cure can be safely directed.

4. It is, perhaps, owing to these causes of difficulty that the disorders and morbid changes to which the kidneys are liable; the signs and symptoms by which they are indicated; and the means most efficacious in their removal, have made so little progress until recently; and still require, notwithstanding the advances which have been lately made, so much further elucidation. In the present consideration of the *diseases of the kidneys*, I shall first describe the *inflammatory diseases*, and their pathological and therapeutical relations; and afterwards notice the *changes, chiefly structural*, consequent upon these, and upon other disordered states.

I. Inflammation of the Kidneys. — Synon. — *Nephritis.* — Νεφριτις, Hipp., Galen, (from Νεφρος, the kidney.) — *Renum Inflammatio*, Sennert. *Phlegmone renum*, Prosper Alpinus. *Cauma Nephritis*, Young. *Empresma Nephritis*, Good. *Inflammation des Reins*, *Nephrite*, Fr. *Nierenentzündung*, *entzündung der Nieren*, Germ. *Nefritico*, *Inflammazione di reni*, Ital.

Classif. — 1. *Class*; 2. *Order* (*Cullen*).
3. *Class*; 2. *Order* (*Good*). III. Class,
I. Order (*Author* in *Preface*).

5. Defin. — *Pain in the lumbar region, often extending anteriorly through the abdomen, or descending to the groin and testes, with retraction of the latter, disordered state of the urinary secretion and excretion, febrile disturbance, sometimes numbness of the thigh, and nausea or vomiting.*

6. These symptoms are the most characteristic of inflammations of the kidneys; yet they are not all present, unless in some of the more acute cases, or when the inflammation extends to the greater part of the tissues composing the organ; and they may be attended by various contingent and much less constant phenomena. In the slighter and more partial cases, particularly when the disease commences insidiously and proceeds slowly, any one, or more than one, of these symptoms may be absent; a disordered state of the urinary secretion and excretion being the most constant.

7. Until very recently, all the inflammatory and painful affections of the kidneys, whatever may have been the particular tissue affected, were comprised and confounded under the term nephritis. Late investigations have, however, shown that inflammations differ both as respects their *seats* in the particular tissues composing these organs, and as regards their *natures*, in relation to the states of the constitution, and the causes which produced them. I shall therefore describe: 1st, *The inflammations seated in the cortical or vascular, and in the tubular structures of the organ, with the modifications and complications and lesions usually presented by them*; 2d, *The inflammations seated in the calices and pelvis of the viscus, in connection with their modifications and complications*; and, 3d, *Inflammation of the investing structures of the organ.*

8. i. Inflammation of the Vascular and Tubular Structure of the Kidneys. — Synon. — *Nephritis propria*, Author. — *Nephrite simple*, Rayer. — *Nephritis proper.*

9. *A.* Causes. — *a. The predisposing causes of* nephritis are, chiefly, hereditary conformation; the middle, advanced, and matured periods of life; the male sex, sanguine temperament, and plethoric habit of body; indulgence, long at a time, in soft warm beds; the use of much animal food, and of highly seasoned or spiced dishes, of too much food, and fermented liquors; addiction to venereal pleasures; riding much on horseback, or in a carriage; chronic disorders of the digestive organs; sedentary occupations, indolence and a neglect of due exercise; and the superabundance of excrementitious matters in the blood, more particularly of urea and its combinations. The calculous, gouty, rheumatic and scrofulous diatheses, and diseases of the bladder, prostate gland, and urethra, whether these depend upon hereditary descent or upon acquired disposition and advanced age, especially predispose to nephritis, and modify more or less the characters and course of the disease, the varieties and complications which result from their influence requiring a particular notice.

10. *b.* The *exciting* and *concurrent causes* of nephritis are injuries, blows, contusions, concussions, or wounds of the region, or in the vicinity of the kidneys, or of the spine; sudden jerks experienced on horseback, or in a carriage, or occasioned by missing a step on descending stairs; falls on the back or thigh; too long retention of the urine; the improper use of irritating diuretics, of emmenagogues, or of aphrodisiacs; too long a course, or too large doses, of the preparations of iodine, of nitre, &c.; indulgence in spirituous liquors; venereal or other excesses; the presence of calculi in the kidneys, or in the ureters; calculi in, or inflammations of, the urinary bladder; the sudden suppression of the perspiration, especially when inordinately increased; sleeping in the open air, or on the ground; sleeping in damp beds or sheets; cold and moisture applied to the loins, or lower extremities; cold and humid states of the air; currents of cold air striking against the loins; sitting with the back to a hot fire; the sudden interruption of accustomed discharges, as

the hæmorrhoids, catamenia, fluor albus, sudor pedum, &c.; the retropulsion and drying up of chronic eruptions, and old ulcers by external treatment; the sudden transfer of morbid action from the urinary bladder, genital and sexual organs, from the psoæ muscles, or from the organs of digestion and respiration, or interruptions to the healthy functions of those organs; retrocession or misplacement of gout, metastasis of rheumatism; paralytic affections, diseases and injuries of the spine or spinal column, and especially paraplegia; fevers characterised by a low state of the vital energies, and oppression of the nervous functions, with coma, &c.; the presence of animal poisons, purulent or sanious matters, or other hurtful excrementitial substances in the circulation, however, introduced there, whether by absorption, or from morbid changes in the chyle or blood, during the progress of other diseases.

11. From the above enumeration of the causes of nephritis, it will be manifest, that this disease, in some one or other of its forms, will appear — 1st. As a *primary* and *simple* affection, the result of causes influencing the vascular state of the kidney or kidneys, without any very manifest pre-existing lesion of this or any other organ, either in function or structure; — 2. As *consecutively* upon some other malady, affecting either this particular organ, or some other, or even the constitution generally; as upon the formation of calculi in the kidney itself, upon inflammation of the bladder or testis, upon gout, or upon disease of the prostate gland or urethra, or during the progress of fevers; — 3. When appearing secondarily it may either form the chief or only lesion, or constitute one of a *complicated* state of disease; as when the nephritis is complicated with gout, rheumatism, or with other diseases of the urinary organs; — 4. Whether occurring *primarily* or *secondarily*, it presents various grades of activity, from the most *acute* to the most *chronic*, and gives rise to changes, which have some relation to the severity and duration of the attack; the circumstance of one or both kidneys being affected; the constitution and diathesis of the patient; the nature of the predisposing and exciting causes, and of the disorders which have preceded, or become associated with it, although such relation may not be obvious, nor admit of being traced with ease and certainty, numerous circumstances occurring and modifying the march and consequences of the disease.

12. *B.* Description.—The *symptoms* of nephritis vary extremely, according to the severity of the attack and the particular part of the organ inflamed; to the circumstance of one only, or of both kidneys being affected; and to the mode of attack. Inflammation seizes on either one or both organs, according to the predisposition of the patient and the nature of the exciting causes: but in either case, it may appear with great severity and suddenness, or in a mild, slight and insidious manner; or it may commence in this latter manner, and quickly pass into an acute and very severe form: on the other hand, a sudden and an acute attack may degenerate into a very obstinate and chronic form, notwithstanding the best efforts of the physician.

13. Not only may *inflammation of the vascular and tubular structures of the kidneys* assume any grade of intensity, and hence be *acute*, *sub-acute*, or *chronic*; but it may also be *modified in character* by the nature and combinations of its causes; by the diathesis, constitution, and age of the patient; and by the states of the circulating fluids. I shall therefore consider, *firstly*, its simple form, and as usually observed in a previously healthy constitution: and, *secondly*, the modifications arising from those circumstances.

14. *a.* The *symptoms of simple nephritis*—of *primary or idiopathic nephritis* — of inflammations of the vascular and tubular structure of the kidneys, which are independent of diathesis, of constitutional vice, or of animal poisons, vary with the severity of the attack, and with the age and irritability of the patient. — *α.* The *acute form* of the disease is generally attended, at its invasion, with chills, horripilations, or distinct rigors, and one or other of them occasionally, sometimes daily, appear during its course. A sense of heat, which augments rapidly, is at first felt in one or both lumbar regions. This soon is accompanied with pain, at first tensitive, afterwards lancinating and pulsating, in the same situation. The pain is at first not aggravated by pressure from behind, nor from before, unless it be applied firmly; but it is generally increased upon a full inspiration, and on coughing or sneezing, particularly when pressure is made upon the abdomen at the same time. The pain is also momentarily aggravated by efforts to pass a costive stool or to expel the urine, and at the time of turning suddenly around, or from side to side, and upon sitting down, especially upon a low seat. A very warm bed increases it, and a chill of the surface has generally a similar effect. The pain extends anteriorly through the abdomen; stretching in the course of the ureters and spermatic vessels and nerves, to the hypogastric region, often with extreme violence, to the testes, which are drawn closely to the abdominal ring, and descends to the extremity of the penis, which is small and retracted. Numbness is frequently felt in one or both thighs, according as one or both kidneys are affected; and this feeling is sometimes accompanied with painful lancinations in the thighs, descending often as low as the knee. The pain, posteriorly, ascends as high as the shoulder-blades; it is increased in the region of the kidneys, and is attended by an augmented sense of heat and pain after lying for some time on the affected side, when one kidney only is inflamed, or on the back when both are affected, although these positions give at first slight ease.

15. The *urine* is generally passed frequently and with aggravation of the pain. It is at first limpid and colourless, but is much diminished in quantity, becomes deeper in colour, and is voided more frequently and with more pain as the disease increases in severity. In the most acute cases, particularly when both kidneys are affected, the urine is in very small quantity, is voided with the most painful efforts, sometimes only in drops, is of a reddish, or sanguineous, or brown colour, or with small brownish flocculi; and it is often nearly, if not altogether, suppressed, so that the bladder is found empty upon the introduction of the catheter. The chief changes presented by the urine in simple nephritis are — 1st, it contains some blood or albumen; 2d, it is but slightly acid, or neutral, or alkaline; 3d, it sometimes contains a little purulent matter, or muco-puriform matter, particularly when the inflammation extends to the calices or pelves of the kidneys, or

when the disease is associated with inflammation of the mucous surface of the bladder, or of other parts of the urinary passages. Where nephritis is caused by cantharides, turpentine, or cold, the urine very commonly contains blood. In the simple form of nephritis, the presence of albumen in the urine is not constant, as is the case in the granular disease of the kidneys, or *albuminous nephritis*, as it is called by M. Rayer.

16. Soon after the accession of rigors, at the invasion of the disease, nausea and vomiting are often present. In the most acute states, retching continues throughout, although nothing may be rejected, and is renewed after taking fluids, so that the patient refuses every thing. He often complains, also, of severe colicky pains in the abdomen, which is sore upon firm pressure; particularly towards the lateral and epigastric regions. There is generally constipation, frequently with repeated desires to go to stool, and occasionally with tenesmus; all these symptoms depending upon intimate consent of parts. The *pulse* is hard and frequent, and full during the remissions of pain; but in the paroxysms or accessions of pain, it is smaller and contracted. The *skin* is at first hot, dry, or burning; but, as the disease advances, it becomes more moist, is partially and irregularly covered by a disagreeable perspiration, and, in cases characterised by a partial or total suppression of urine, the perspiration has an urinous odour.

17. When the *disease extends to the investing membrane* of the kidneys, the symptoms are then very acute, the pain severe, the pulse hard and contracted, and the urine is less changed from the natural state, relatively to the severity of the pain and constitutional symptoms, then when the secreting structure is chiefly affected. But the disease is more rarely limited to one or other structure, although either may be its principal seat. When it commences in the secreting and more internal textures, or in the calices or pelvis of the organ, the urine contains much mucous or muco-puriform matter, and is very scanty; and the pulse is softer, the symptoms are milder, and the *course of the disease* slower than that above described, *which is seldom prolonged* beyond a fortnight, frequently not beyond six or seven days, without giving rise to some one of the changes or lesions which will be noticed in the sequel. When the attack is occasioned by the irritation of calculi in the kidney, there are commonly more numbness of the thigh and painful retractions of the testes, and severer pains, shooting at intervals to the hypogastrium or in the course of the ureters, than in the more primary and simple states of the disease, which states are of less frequent occurrence than this, and of shorter duration; this particular cause, and the complication produced by it being generally a chronic disease, liable, however, to assume an acute or subacute form, as will be noticed hereafter.

18. *Acute* and *sub-acute nephritis* most commonly implicates one kidney, both organs being more rarely affected, especially in the same degree, at the same time. Whilst total suppression of urine may be considered as distinctive of severe disease of both kidneys, yet both may be inflamed, and a scanty secretion take place, for a portion of either organ may be still enabled to perform its functions. These states of nephritis commonly present themselves as follow: — 1st. *Mild acute or sub-acute:* — the pain in the loins slight; little diminution or change of the urine; slight symptomatic fever, and speedy subsidence of the disease under treatment. 2d. *Simple acute and sthenic nephritis:* — greater severity of the pain and of the other symptoms; inflammatory fever, preceded by rigors; marked diminution of the urine, with the morbid appearances and disorder attending the discharge of it, described above (§ 15.). 3d. *Acute nephritis, with ischuria, and disturbance of the cerebral functions:* — suppression of urine altogether or nearly complete; vomitings or retchings from the commencement; pain in the loins, in some cases severe, in others obscure; lethargy, sopor, or coma, supervening in the worst attacks. 4th. *Asthenic or malignant acute nephritis:* — inflammation of the structure of the kidneys occurring during states of cachexia, or coincident with morbid states of the blood and depression of vital power, or appearing in the course of low fever or scarlatina, attended by a lurid, dusky, and offensive odour of the surface of the body; little or no pain in the back or loins, unless firm pressure be made; the supine posture, in a state of stupor, or sopor, the patient answering questions with difficulty and imperfectly; suppressed, scanty, or involuntary excretion of urine; frequent occurrence of slight rigors; the tongue dry, loaded, and brown; little or no thrist; stupor, coma, and an offensive odour proceeding from the surface.

19. *β. Sub-acute nephritis.* When inflammation of the secreting structure of the kidney takes place *slowly*, in a mild and sub-acute form, the patient complains of dull or shooting pains in the lumbar region, occurring at longer or shorter intervals, with disorder of the secretion and excretion of urine, aggravated by errors of diet and regimen. These symptoms are connected with more or less disturbance of the system generally, and of the functions of the digestive organs; frequently presenting periods of aggravation and amelioration, and occasionally assuming suddenly, especially after the operation of one or more of the causes above enumerated (§ 10.), a very acute form.

20. This state of the disease is of very uncertain *duration*. Sometimes it continues, with intermissions, for several weeks or even months, when it may assume a very *acute* or *hyper-acute form*, or may subside into a less severe and more *chronic state*.

21. When *sub-acute* nephritis passes into a *hyper-acute* state, the disease may reach its utmost severity in two or three days, and if circumstances favour its continuance, or insufficient means be adopted to subdue it, the symptoms assume, in one, two, three, or four days more, the most dangerous character. The pain becomes sometimes insupportable; the pulse small, contracted, unequal, or intermittent, frequently slow; the extremities become cold, or are kept warm with difficulty; the countenance assumes a leaden or murky hue, and the features are otherwise much changed; hiccup supervenes, and a cold, fœtid, or urinous perspiration covers the surface of the body. The urine, if any be voided, is usually now very dark-coloured, filamentous, passed drop by drop, and of a cadaverous odour. The muscular force sinks rapidly: fainting delirium, con-

vulsions, stupor, and coma supervene, and the patient dies.

22. *γ. Chronic Nephritis.*—Inflammation of the substance of the kidney may exist in either the *acute* or *sub-acute* form, and gradually lapse into the *chronic state.* Or, inflammatory action may commence in a slight and mild form, proceed gradually and insidiously, and be so obscure as not to awaken the fears of the patient, and as to escape the observation or detection of the physician. In these cases, pain, if at all present, is often slight or obscure; disorder of the quantity and states of the urine; a diminution of acidity, and a neutral or alkaline state of it; disorder connected with the evacuation of it, a feeling of weakness, or of slight numbness in one or both lower extremities, are the symptoms most commonly observed. The urine is generally turbid, occasionally only albuminous, generally abounding with the phosphatic salts and with mucus, and often depositing sediments, or containing more or less of gravelly matters. It is always voided frequently, but in very small quantity at a time. Pain in the loins is often not felt unless on firm pressure, and on taking a full inspiration. It sometimes extends in the course of the ureters; but seldom to the testes. When it is not associated with disease of the bladder or prostate, there generally is little or no fever, unless at night, or when the patient is heated by a warm bed. This state of nephritis is often excited, or perpetuated by disease of the urethra, or prostate gland, or urinary bladder. In some cases this form of the disease approaches a succession of slight attacks of acute or subacute inflammation, each subsiding for a time or returning, or affecting circumscribed portions of the organ. When both kidneys are affected, the chief symptom may be the gradual deterioration of the constitution, and development of cachexia, favouring the occurrence of other maladies, especially dropsy.

23. Many of the organic lesions found in the kidneys upon dissection, as well as the formation of calculi in the organ, proceed from this slight and slow state of inflammatory action of its secreting structure; and, whether passing into more active forms of disease, or giving rise to suppuration, it frequently renders the future life of the patient irksome, especially when affecting old persons, even without producing the latter effect; but when it occasions this, the patient, particularly if he be advanced in life, but rarely escapes. The chronic, as well as the acute, forms of inflammation generally attack one kidney only, and more rarely both at the same time, or in the same degree: hence the urine is very rarely suppressed, although it is often much diminished in quantity. RICHTER (*Therapeia Specialis*, t. i. p. 534.) says that the left kidney is more frequently inflamed than the right; and a similar opinion has been stated by other pathologists; but this is not satisfactorily proved.

24. *δ. Nephritis in the female* is a less frequent and less dangerous disease than in the male, but it is often more difficult of detection in its chronic forms especially; and it is liable to be mistaken for affections of the uterine organs, with which also it is occasionally complicated. The existence of pain in the lumbar region extending to the abdomen, and shooting towards the bladder and groin, with numbness of the thigh and disorder of the secretion and excretion of the urine, are, however, sufficient to prove the existence of nephritis in this class of patients. Two cases of the disease in females have come before me which had been mistaken for disease of the colon, and one for inflammation of the bowels. This want of knowledge of so very important a disease has evidently arisen from the very slight attention paid to diseases of the kidneys by systematic writers, and to the careless way in which the urinary secretion is examined by too many practitioners. Nephritis is not infrequent among females recently confined, but is then commonly associated with inflammation of the veins of the uterus and ovaria, or with peritonitis.

25. C. TERMINATIONS, &c.—*a.* When resolution takes place, the severe symptoms abate from about the fourth to the ninth day in the more *acute* cases; and, in the *sub-acute state,* frequently not until the twelfth or fifteenth of the attack. When this change occurs the urine becomes more abundant, paler, is voided with less uneasiness, and deposits a sediment: the pulse becomes more natural; occasionally fuller, softer, and even quicker than previously, especially if it have been slower during the acute state; a general perspiration breaks out, and critical discharges, particularly the hæmorrhoidal and catamenial, sometimes appear, especially when the disease has arisen from suppression of these evacuations. In some cases, particularly in persons advancing in age, resolution is imperfect, the urine continuing scanty and albuminous, other symptoms remaining in a slight form. In these there is reason to suspect that slight depositions of coagulable lymph have taken place, during the acute state of the disease, in the tissues composing the body of the organ, and are giving rise to granular degeneration.

26. *b. Suppuration* or *abscess* does not so often occur during inflammation of the vascular and tubular structure of the kidney, than is supposed. The presence of purulent or muco-puriform matter in the urine is no proof of suppuration of these parts, but merely shows that the inflammation has extended to the *calices* and *pelvis* of the organ.—*Abscess* of the kidney may be the consequence of inflammation either unconnected with, or depending upon, calculi in the tubular structure. It may also proceed from slight or *chronic* or *subacute* inflammation in scrofulous subjects, and more commonly it is in them unconnected with calculi, and assumes a more chronic character. — If the very *acute* form of nephritis continue, without material alleviation, beyond seven or eight days, or the sub-acute persist longer than fifteen days, the formation of matter may be dreaded, especially if, about this time, several of the following symptoms appear: when the disease passes from an acute into a more chronic state, or milder character, the pain and heat being abated, but still continuing; when the pain becomes dull and pulsating, with a sense of weight or embarrassment in the lumbar region, and increased numbness of the thigh corresponding with the organ affected; when rigors occur irregularly or at different hours of the day; and when perspirations become frequent and copious, the pulse small, weak, and soft, the symptomatic fever assuming an adynamic, and subsequently a typhoid character, cerebral symptoms supervening, we may then conclude that an abscess has formed in the structure of the kidney.

27. In the more *chronic* or *sub-acute* cases terminating in abscess, an œdematous fulness or swelling, without change of colour, is sometimes observed. In several instances, firm pressure of the lumbar region occasions acute pain, extending to the groin; and the urine contains either blood or gravelly matter, or a whitish purulent matter more or less intimately mixed with it, and rendering it thick and turbid. In these more chronic states, the constitutional symptoms are nearly those of hectic fever. The symptoms may truly indicate the existence of abscess, and yet no pus be seen in the urine, which may even remain clear. But, after a considerable time, the matter finds its way into the pelvis of the kidney, and a large quantity of pus, with some blood, is evacuated with the urine, often occasioning, by its acrimony, much irritation of the bladder and urethra. In other cases little or no pus is evacuated in the urine, owing to the passage along the ureter being obstructed, either at the pelvis of the kidney, or in some part of the ureter, by a large calculus, which most probably had induced the inflammatory action giving rise to abscess, and which now prevents the passage not only of the matter, but also of the urine to the bladder. In some of these cases, the abscess points externally in the back or loins, or even in the side or above the groin, the patient either sinking under the affection, or partially or altogether recovering. The abscess may burst internally into the peritoneal cavity, and it then proves quickly fatal; or it may open into the colon, and the patient either recover or sink. Of these occurrences, numerous instances are recorded in the works contained in the *Bibliography* to this article.

28. In the greater number of cases of abscess, "the ureter remains more or less pervious, and the patient continues at intervals to discharge pus, and sometimes small calculi, blood, &c., with the urine for a long time" (Prout). — When the abscess opens externally, the aperture continues for a considerable time to evacuate purulent matter of an urinous odour, or pus mixed with urine, and sometimes urine only. When the abscess discharges pus merely without any urinous odour, or without any intermixture of urine at any period of the discharge, it is then very doubtful whether the abscess is connected with the kidney or no. It may proceed from caries of one of the vertebræ, from which it is necessary to distinguish the abscess now under consideration.

29. When the *fistulous opening*, leading from an abscess of the kidney, becomes obstructed either by granulations or by a calculus, the discharge ceases, and a pulsatory pain generally returns in the lumbar region, followed by increased heat of skin, accelerated pulse, or even delirium, which continue or increase until the obstruction gives way before the accumulated matter. When at last the external opening heals up, without the immediate return of the previous dangerous symptoms, a relapse may take place at a more remote period, owing to the return of the inflammation, probably again induced by a calculus formed in the kidney. In the majority of cases, especially in the earlier stages, of abscess, one kidney is only affected; but this may be altogether destroyed by it. In protracted cases, particularly in aged persons, the other kidney generally participates in the disease, to a greater or less extent, before the one first attacked is altogether disorganised. Although suppuration is a consequence of inflammation, whether unconnected or complicated with calculi in the kidney, yet the origin of the calculi is a matter of importance. It is very probable that they may be a result of slow inflammatory action of the tubular structure, and that, when they are formed, they heighten this action, and give rise to suppuration. (See Urine, &c.)

30. When the *chronic states* of nephritis occurs in scrofulous persons, abscess often results, even independently of calculi, with which, however, the abscess may be associated. When abscess takes place in the strumous diathesis, the symptoms attending its formation and maturation are much more obscure than in other constitutions, and the disorganisation of the kidney generally is more complete. In the latter stages of the disease, and in the more chronic cases, Mr. Howship has remarked that the patient refers his complaints more to the neck of the bladder than to the region of the kidney; but in recent cases this is not so generally observed. Dr. Prout has met with instances, where the pain referred to the lumbar region, as in ordinary cases, and the urine was acid, and, abstracting the pus, not very unnatural. I agree with Dr. Prout in imputing the sufferings in the bladder, in the more chronic cases of this form of abscess, to the exceedingly fœtid, acrid, and unnatural state of the urine, which is usually alkaline, and evidently of so irritating a nature as probably not to be retained in a healthy bladder for a moment, without producing great pain. Mr. Howship, however, mentions instances of this form of the disease, where the urine appeared natural, and yet the pain was referred to the bladder nevertheless. But there was very probably, in these cases, disease of the prostate gland, or inflammation of the parts in its vicinity, or of those adjoining the openings of the ureters, complicated with the disease of the kidney; for I have observed such complications in cases which occurred in my practice, where the symptoms were chiefly referred to the bladder, and yet the urine seemed nearly natural. Dr. Prout remarks, that the cases of this scrofulous affection of the kidneys that he has seen, have also been attended with indolent tumour and abscess of the inguinal glands, and by occasional pain and swelling in the testicles. They were accompanied by great extenuation of the body, and derangement of the general health; and in all instances ultimately proved fatal. (*On Diseases of the Urinary Organs*, p. 216.)

31. *c.* The termination of nephritis in *gangrene* is very rare; the change actually taking place and often mistaken for gangrene, as sometimes approaching this state, is *softening*, more or less marked, of portions of the inflamed tissues, with purulent infiltration, in a greater or less number of points. If gangrene take place, it is indicated by the symptoms usually attending it in other organs, especially by sudden sinking of the vital powers, and cessation of pain; singultus, vomitings, anxiety, restlessness, coldness of the surface and extremities; small, thready, and weak pulse; wanderings of the intellects, and delirium. The urine also becomes altogether suppressed, or remarkably scanty and fœtid.

32. *d.* Some degree of either *induration* or *soften-*

ing may follow acute nephritis, particularly the former; and the patient may either apparently recover, or the disease may assume a chronic form. Some degree of induration of the substance of the organ consequent on the acute state of the disease, may not be inconsistent with the discharge, to some extent, of its functions; and when one organ only is affected, the urine may not be materially altered, or even not at all diminished. In these cases, the quantity secreted by the indurated organ cannot be ascertained, as the function of the healthy kidney is increased. The albuminous state of the urine in these cases seems to indicate that the indurated kidney still performs some part of its functions.

33. *D.* CHANGES OBSERVED AFTER DEATH *from inflammation of the vascular and tubular structure of the kidney. a.* At an early stage of the *acute* form of the disease, the *volume* of a part or of the whole of the organ, according as the affection is general or partial, is more or less increased. In a few cases the kidney may be increased to twice, or even thrice, its natural bulk. At this period, and before the parts inflamed become infiltrated with pus, they present a morbidly *red tint*, generally a deep or *dark red*, and sometimes a brownish ecchymosed appearance. The vessels of the cortical structure and the more superficial veins are enlarged and more than usually distinct. Besides these, M. RAYER remarks that a number of small points of a lively red, not elevated above the surface, may be seen with the unassisted eye in the exterior of the organ. These small red points are also found in the first stage of granular disease or inflammation of the kidney — of the *nephrite albumineuse*, of this writer,—and are often intermingled with black points and with small vesicles. These latter points are often surrounded by a very delicate network of vessels. On division, the vascular or cortical tissue of the inflamed kidney presents a similar congeries of red points, distinct from the orifices of divided vessels; these points are disposed in lines or series, very rarely in groups, and are the glandules of MALPIGHI—the *corpora Malpighiana*—highly injected. Sometimes these glandules, especially at the exterior of the organ, assume the appearance of dark or black spots, either isolated and distinct, or approaching each other in a series or in groups. The surface of the organ, also, presents an irregularly red tint, with scattered spots of a livelier red than that of the surrounding tissue. The substance inflamed is, moreover, dotted with true ecchymoses, disposed either in lines, or in bands, which probably become the bases of the purulent infiltrations observed at a further advanced stage.

34. When the acutely inflamed kidney is augmented in volume and weight, it often also presents a *red induration* of the vascular and tubular tissues. This induration and redness are commonly general as respects both these tissues; and the glandules of MALPIGHI are also highly injected and very apparent. Upon pressing the divided parts of an indurated, reddish brown kidney between the fingers, a larger quantity of blood escapes than in the healthy state; but not with that facility observed in the passive congestions of the organ consequent upon intercepted circulation through the right side of the heart.

35. In some states of simple acute nephritis, M. RAYER has observed portions of the organ in a state of anæmia interspersed between other parts which are morbidly red, and ecchymosed, or infiltrated with pus. This association of anæmia of some portions of the kidney with inflammatory injection &c. of other portions, is also often found in cases of chronic nephritis which have passed into the acute form previously to death.

36. Purulent infiltration is more frequently remarked in the vascular than in the tubular tissue of the organ; the former portion being more commonly and severely inflamed than the other. The infiltrated pus appears in the form of grains of white sand, or of minute depôts of the size of pins' heads, surrounded by a brownish red tissue. In some cases, the purulent formations are much larger, although less numerous, being of the size of pustules, or of small peas, and, in rare instances, as large as nuts. It is comparatively rare to find abscesses, or purulent collections in the substance of the kidney larger than these, most of the cases of large abscess in this organ, being purulent collections of the calices and pelvis consequent upon inflammation of these parts, and obstruction of the ureter. These collections are surrounded by a deeper redness than that of the adjoining parts, even when the whole of the organ is inflamed. The small abscesses, seen at the surface of the kidney, penetrate more or less deeply into its substance, and often infiltrate the tissue immediately around them, so that drops of pus may be squeezed from it, by the point of the scalpel. Some parts of the organ are *softened* and *infiltrated* with pus, and are of a yellowish white colour, drops of pus being squeezed from them when divided; these have not yet proceeded to the state just described, or are merely in the course of passing into that of small abscesses; they are met with in the vascular as well as in the tubular structure. *Gangrenous softening* is very rarely observed in these structures, and is characterised by its brownish hue, by their tomentose aspect when they are plunged in water, and by the odour exhaled by them.

37. *b.* The *chronic forms* of nephritis present various changes; some of which are very opposite in their natures. When the whole of the organ has been chronically inflamed, *atrophy* of it is much more frequently observed than *hypertrophy*, which also occurs. In some instances the vascular tissue of the organ presents a species of hypertrophy occasioned by a deposition on it of lymph, which has assumed subsequently a fribro-cellular character. In others, patches of a yellowish colour are seen exteriorly, and are found to consist of a somewhat similar substance, manifestly produced from coagulable lymph long previously thrown out. After the chronic states of inflammation, the substance of the organ is more or less indurated, denser and specifically heavier than natural. The external surface is often granulated, or rugous, or it presents a variously coloured, or marbled appearance. Deep redness is seldom observed, unless an acute state of inflammation has supervened on the chronic shortly before death, and then it is seen both on the surface, and more or less through the substance of the organ. An anæmic condition, either partial or general, and commonly associated with induration or increased density of the textures, is one of the most frequent lesions produced by chronic simple nephritis: and is generally further associated with a granu-

lated and marbled state of the surface, and with atrophy. This anæmic state commences in the vascular tissue, and extends to the tubular texture, both of which may become ultimately pale, indurated, and atrophied in a very remarkable manner. When atrophy takes place in several distinct points or parts of the organ, the external surface often presents an unequal, rugous, or mammalated appearance. The *papillæ* of the cones or tubular structure undergo various changes consequent upon their induration. Sometimes the *cones* are very acute, and of a whitish yellow colour. The papillæ are occasionally eroded or infiltrated with pus, more rarely they are ulcerated.

38. *c.* The *membranes external* to the organ often participate in the inflammation of the more internal textures, and present the usual consequences of this participation, especially vascular injection, exudation of coagulable lymph, and, in the chronic cases, thickening of the membranes and increased adhesions of them over the parts inflamed. In some cases they also experience various changes of colour, chiefly of a brownish or blackish hue; and occasionally they are changed, in places, to fibrous, fibro-cartilaginous, or even to a cartilaginous or osseous state. Besides these lesions, others hereafter to be described take place as a consequence of inflammation; and various inflammatory changes are also observed in the calices and pelvis of the organ. The veins of the kidneys are sometimes inflamed, but independently of this form of nephritis. Renal phlebitis is more frequently associated with granular degeneration of the kidneys or albuminous nephritis.

39. *E.* DIAGNOSIS OF THE SIMPLE STATES OF NEPHRITIS.— *a.* The distinctions between these and the other forms of nephritis will be made more manifest when the latter come under consideration. I shall, therefore, merely remark very briefly that, in the gouty variety of nephritis, the urine deposits crystals of uric acid, which are never observed in the simple form of the disease; and that the granular degeneration of the kidney is always either accompanied with or followed by dropsy, and characterised by a constant and marked albuminous state of the urine, this latter change being only accidental and evanescent, although sometimes recurring, in the simple forms of nephritis. The inflammation of the substance of the kidneys, occurring in the course of low and exanthematous fevers, arises from the morbid poison in the blood, or rather from the accumulation of excremential matters, and the consequent alterations, in this fluid, in connection with the state of organic nervous power; and, from being thus a consecutive disease, and attended by certain features hereafter to be noticed, cannot be confounded with the primary and simple nephritis just described.

40. *b.* It is often impossible to distinguish the acute form of simple nephritis from *inflammation of the investing membranes* of the kidneys on the one hand, or from *inflammation of the pelves and calices* of these organs, on the other; because the disease is seldom limited altogether to either of these structures, although it be seated in one or other chiefly. When the urine contains much mucus, or a muco-puriform matter, the urethra and urinary bladder being sound, then the morbid secretion can proceed only from the pelves and ureters. But, in these cases, it is almost impossible to say that the bladder is healthy. However, when inflammation of the pelves and calices is so severe as to produce an abundant secretion of mucus, it is very rare that the substance of the kidney does not participate in the inflammation. When, in addition to this secretion, there is severe pain felt in the loins, attended by vomiting and other acute symptoms, it may be inferred that the disease extends to both the substance and the pelvis of the organ. It is much more difficult to distinguish the *chronic states of inflammation of the substance*, from *those of the pelvis*, of the kidney, even although the morbid action be confined to either structure; but such limitation often does not exist, both parts being implicated, although one or other is more especially affected. Still, in the simple chronic nephritis, the quantity of muco-puriform matter in the urine is much less than when the calices and pelves are chronically inflamed, and the phosphates are more frequently found in suspension. Most of the cases usually denominated abscess of the kidney are nothing more than accumulations of pus in the pelvis, owing to the obstruction caused by a calculus distending it and the surrounding parts, and transforming the organ into a large multilocular tumour, containing puriform matter. When the inflammation is seated chiefly in the calices and pelvis of the organ, and especially when it is caused and perpetuated by calculi, then more irritation is felt in the bladder, especially about its neck, and more pain in the course of the urethra, than in other cases. The irritability of the bladder is sometimes so great, in these cases, as to almost amount to incontinence of urine.

41. *c. Inflammation of the* surrounding *cellular tissue*, or of the *investing membranes* of the kidneys, very closely resemble acute nephritis; but there is not such remarkable changes in the quantity and character of the urine, or such disorder connected with the excretion of it, correspondent with the acuteness of the local and constitutional symptoms, as are observed in true nephritis. When the *membranes* especially are inflamed, the sense of heat and the pain are very great, whilst the diminution of urine, and the difficulty of excreting, are not so remarkable. When the *surrounding cellular tissue* suppurates, and a considerable abscess is formed, the lumbar region becomes full and distinctly œdematous, and ultimately even fluctuation may be detected. Inflammation of the *cellular tissue surrounding the psoas muscle* — *psoitis*, or the commencement of *lumbar abscess* — may be mistaken for nephritis; but in the former disease the pain is much increased upon flexure of the thigh upon the trunk, whilst the secretion and evacuation of urine are either not disordered or but slightly disturbed.

42. *d.* Nephritis is distinguished from the simple irritation consequent upon the *passage of a calculus along the ureter*, chiefly by the fever which accompanies the pain of nephritis from its commencement, and by the pain never being altogether absent, although it is generally characterised by remissions and exacerbations. Nephritis can hardly be confounded with *nephralgia:* this latter affection is very rare; the pains constituting it are much more violent than those of nephritis, are sudden in their accession and disappearance, and are unattended by fever or heat of skin.

43. *e.* From *acute rheumatism* nephritis will be readily distinguished by the nausea, vomiting, colicky pains in the abdomen, the numbness of the thigh, the extension of the pain to the hypogastrium and groins, and to the testes, with retraction of them to the abdominal ring, and the disorder of the secretion and excretion of urine which characterise the latter disease, but which do not attend the former, unless rheumatism attacks or extends to the investing membranes of the kidneys, as will be more particularly noticed hereafter. *Lumbago* can hardly be mistaken for nephritis, as, besides the absence of the above symptoms in the former disease, it is seldom attended by any febrile action; and the pain on bending the back, upon rising from a seat, or exerting the dorsal muscles is distinctive of the rheumatic nature of the affection.

44. *f.* In *females*, nephritis is often distinguished with difficulty from *colic*, from inflammation of the psoæ muscles, from enteritis, from obstruction and inflammation of the colon, and from inflammation of the internal iliac vein or artery. Numbness of the thigh, pain in the lumbar region, extending in the course of the uretus to the groins, insides of the thighs, and urinary bladder, and being referred more to the posterior regions of the abdomen than to its anterior aspect, with absence of tenderness upon slight pressure, and the disorder of the secretion and excretion of urine, are generally sufficient to mark the nature of the disease.

45. *g.* It is often more difficult to distinguish nephritis from *uro-cystitis*, than is generally supposed. It should, however, be recollected, that both diseases are often associated; and that both simple nephritis and inflammation of the pelvis of the organ, caused by the irritation of a calculus, may be attended by more severe symptoms referred to the bladder and urethra than those felt in the lumbar region; whilst uro-cystitis may be attended by pain in the loins, and various other symptoms of nephritis. The great irritability of the bladder, the appearance of the urine, the pain behind the pubis, and the absence of numbness of the thigh or of pain and retraction of the testes, unless when the kidneys are also affected, will generally indicate the seat of the disease. But this subject will be noticed more particularly hereafter.

46. ii. MODIFIED STATES OF NEPHRITIS.— Inflammation of the kidneys presents various modifications or varieties proceeding from the diathesis of the patient, and the nature of the exciting causes.

47. A. *Of Gouty Nephritis — of Nephritis in the Gouty Diathesis.* The fact of gout attacking the kidneys was first remarked by ARETÆUS, and more particularly by WEPFER, SPECHT, SYDENHAM, BONET, F. HOFFMANN, MORGAGNI, DE HAEN, STOLL, VAN SWIETEN, CHOPART, and by other practical writers of the last century. Modern authors, especially BARTHEZ, HOME, GUILBERT, PROUT, SCUDAMORE, BRODIE, RAYER and others, have further shown that inflammations of the kidneys, either with or without gravelly and calculous formations, but most frequently in connection with them, are very liable to occur in gouty constitutions, or in connection with gouty attacks, and to assume peculiar features.

48. *a. Symptoms.* — These vary remarkably according as the inflammation is associated with uric acid gravel in the vascular and tubular structure, or with calculi in the pelvis or other parts of the organ, or with disease of the bladder or prostate gland. Gravel or some calculi may exist long in the substance of the kidney, without any of the symptoms of disease of the organ being felt, or at least felt so as to attract particular notice. It is only when these produce irritation, or when various circumstances occasion vascular determination or congestion of the kidneys, or when a calculus is arrested in the ureters, that indications of disorder in this quarter present themselves. In these cases, the disease assumes features more particularly noticed in the article URINE, and gives rise to those painful affections usually called *nephritic colic.* When these painful attacks occur in a gouty person, and are accompanied by a frequent desire, especially during the night, to pass the urine, this fluid containing more or less albumen, and blood-globules, with acid, they probably depend upon calculi in the pelvis of the kidney, or in the ureter; and this will be still more probably the case, if the pain exist in, or extend to the lumbar region, and is attended by great irritability of the bladder, by incontinence of the urine, by pain about the neck of the bladder and in the urethra, and by uneasiness, numbness, &c. in the thigh, testes, &c. Whenever the urine of a gouty person presents crystals of uric acid, sometimes with a little blood, or mucus, or muco-puriform matter, then the existence of calculi or gravel in the kidney may be suspected, although the symptoms referable to this organ itself may not be very severe or well marked. When these morbid states of the urine are more decidedly characterised, the existence of calculi may be inferred with much certainty, and is often proved by their escape with the urine at no very distant period. When calculi do not exist in the kidneys, pains in the lumbar region are not constant, or are merely passing. The circumstances, however, which more especially distinguish gouty nephritis, are the occurrence of the inflammation in the gouty habit, and in connection with gravel and calculi; the very acid state of the urine, which immediately presents or deposits crystals of uric acid, and the antecedent and attendant symptoms of gout in the system. On the other hand, in *simple nephritis,* the urine is most frequently neutral or alkaline, deposits an amorphous sediment, usually composed of the phosphate of lime, or of the urates, or of the ammoniaco-magnesian phosphate. In proportion to the acuteness of the attack, to the diminution and other changes of the urine, and to the predominance of the symptoms more strictly referable to the kidneys and bladder, is the constitutional or febrile disturbance usually great. When the urine is suppressed or nearly so, bloody, remarkably scanty, or very dark-coloured, and the pains in the loins, &c. and the attendant fever severe, either inflammation, or extremely active congestion of the vascular and tubular structure, or obstruction of the pelvis at the commencement of the ureters of both kidneys, has taken place. When this attack occurs somewhat suddenly, or upon the premature disappearance of gout from the lower extremities, or after the usual premonitory indications of gout, if it appear either as suppressed, or metastatic, or misplaced gout; then acute inflammation, or very active congestion, of the substance of the kidneys, may be inferred to

exist. I lately treated a case of gouty nephritis, in which the urine was of a black, inky tint, and remarkably scanty; this colour having arisen from the action of the acid in the urine upon the blood exhaled from the inflamed organ.

49. *b. On dissection of fatal cases of gouty nephritis,* numerous particles of crystallised uric acid may be detected at the surface, or in the substance, of the vascular structure of the kidney. This substance is generally more or less inflamed in parts, and altered in structure, as already described when stating the lesions produced by simple chronic nephritis (§ 36.). Gravel or small calculi are also found in the papillary structures, in the calices, and in the pelvis of the organ; those in the latter situations being commonly larger than those found in the tubuli. The investing membranes of the kidney are rarely materially altered.

50. *B. Of rheumatic nephritis.* — *a.* The occurrence of nephritis in connection with rheumatism in different parts of the body, has been noticed by several writers; and, in very recent times, also in connection with rheumatic pericarditis and endocarditis, or antecedently or subsequently to these diseases. I have seen nephritis supervene upon rheumatism of the lower extremities, and upon rheumatism of the testes after sleeping in a damp bed; and I have observed in a female, rheumatism of the limbs, of the ovaria, and of the kidneys, nearly contemporaneous, owing to the same cause, the affection, however, of the former parts subsiding as that of the latter became more prominently developed. This variety of nephritis is generally very obscure. Pains in one or both loins, in the limb of the same side, and in the testes, are very equivocal symptoms, particularly in a rheumatic subject, as they may be either simply rheumatic, or symptomatic of inflammation of the kidneys; but when they are attended by ischuria, or by a very marked diminution of the urine, whilst there is not a very copious perspiration, and by an albuminous and acid state of the urine, which is voided frequently, and in small quantity, with increase of pain, and which is either very deep-coloured or deposits a rose-coloured sediment, it becomes probable that the kidneys are actively congested or inflamed.

51. *b.* It is not infrequent to find extensive *organic changes* in the kidneys of persons who have died of diseases of the heart, consequent upon rheumatism; and who have recently, or at no very remote period, complained of disorder of the urinary functions or organs. These lesions have consisted chiefly of the infiltration of coagulable lymph, at several points of the vascular structure of the kidneys. These nearly solid deposits have given rise to marked unequal prominences on the external surface of the organ, where they appear as yellowish patches. These deposits of lymph are of various sizes; sometimes sinking deeply into the vascular structure, and approaching nearly the size of a nut or bean. Their limits are distinctly marked by a dark reddish tint of the surrounding tissue. The membranes external to the kidneys, particularly the portions of them corresponding with the deposits of lymph, are generally injected; the calices and pelves are also inflamed, presenting numerous vascular arborisations and red points. Small collections of pus are sometimes observed in the vascular and tubular structures; and the organ is generally increased in weight and volume, and occasionally, also, more or less indurated. In the more *chronic cases* of this variety of nephritis, or when the nephritic disorder has preceded dissolution a considerable time, eminences and irregularities of the external surface of the organ are observed: and what had manifestly been, in the acute stage, deposits of coagulable lymph, are now changed into a firm yellowish substance, of the consistence of condensed cellular tissue. In the pits or depressions on the external surface, the fibrous and cellular membranes of the kidneys are so firmly united with each other, and with the subjacent cortical substance, as not to be separated unless with the greatest difficulty. These membranes are sometimes thickened throughout, but much more frequently only in patches or partially; where they are also much more opaque. Simple serous cysts are occasionally found in the vascular, and cartilaginous bodies in the tubular, structure.

52. *C. Consecutive nephritis — symptomatic or secondary nephritis — asthenic nephritis.* — Inflammation principally of the vascular and tubular structures of the kidneys often arise in the course of febrile and exanthematous maladies, especially those which assume an adynamic or malignant form, or in which the blood becomes more or less contaminated. In many of these cases, it is a state of *active congestion* of the organ rather than that of *inflammatory action*, which takes place; or if it be the latter, it is inflammation of the *asthenic kind* described in the article INFLAMMATION (§ 54. *et seq.*); and is produced by the morbid state of the blood, or by the superabundance in it of those injurious elements or materials which require elimination from it, and which are usually excreted by the kidneys. M. RAYER has described these consecutive diseases of the kidneys under the head of nephritis from *morbid poisons:* but the affection of these organs is merely an accident or contingency occasionally occurring in the course of certain contaminating maladies, or rarely only in the course of others, and as frequently takes place during paraplegic diseases or after injuries of the spine, as during the progress of those maladies.

53. *a.* During the continuance of *adynamic or typhoid fevers*, and particularly when the nervous manifestations are prostrated or depressed, and where the blood becomes altered either by the accumulation in it of excrementitious matters, or from the insufficient supply of salutary elements, congestion, or asthenic inflammation, not infrequently occurs in the kidneys. In these circumstances *both organs* are generally affected. The pain in the loins commonly complained of during fevers, and attributed to other causes than to inflammation, or to congestion of the kidneys, often misleads the physician, and, when really proceeding from the vascular condition of these organs, is not generally ascribed to it. In other cases the sensibility is so much impaired before this affection supervenes, that the state of the urine itself and the phenomena attending its evacuation, are the chief indications of its existence. In these especially, the *suppression* of the urine may be the first indication of it; and then it may be difficult to determine whether or not the suppression be the *cause* or the *consequence* of the inflammation;

for it may be either. The circumstance of its so being recognised by the physician, will generally enable him to infer correctly the alternative; — if the suppression of urine has been preceded or attended by sopor or coma, or by the supine posture and partial loss of sensibility, the inflammation of the kidneys probably has been consequent upon, or aggravated by it; the suppression being the consequence of *congestion*, which may pass into asthenic inflammation: but if this state of the urinary function has preceded sopor or insensibility, or is independent of this state of the nervous manifestations, then is it the consequence of inflammation of the kidneys, and not the cause. It is extremely rare, however, for the suppression or the nonsecretion of urine to precede those states of disease; more generally the urine is secreted, its *retention* or *accumulation* in its existing morbid condition being the cause of the affection of the kidneys. In all cases of fever, when the urine is retained in the bladder, for some time, or when this viscus becomes distended by it, the supervention of nephritis should be suspected. Whenever, in the course of low fevers, the urine is remarkably scanty or of a dark brown colour; when it ceases or nearly ceases to be acid, or becomes alkaline; when it contains mucus, or blood-globules, or albumen; and when the patient complains of pain or difficulty in voiding it, or of pain or of tenderness on firm pressure of the lumbar region, then disease of the kidneys may be inferred: and this inference will be the more likely to be correct, if suppression or retention of urine follow its alkaline character, and if sopor and the more malignant symptoms become more fully pronounced than previously.

54. *After death* from this consecutive disease, or complication, both kidneys are found congested or inflamed, but one is often more affected than the other. They are always more vascular, redder and larger than natural. At the surface and in the vascular structure, numerous red points, intermingled with purulent specks, are sometimes observed; and the substance of the organ is of a deeper or darker hue than usual, and softened in parts, or torn with greater facility.

55. *b. Consecutive Nephritis* often proceeds from the *absorption of purulent or sanious*, or *other morbid matters* into the circulation. When these matters pass into the blood, and more especially when they are imbibed by the veins, they contaminate this fluid; and the kidneys, being the most active organs in eliminating or excreting them from the system, are especially exposed to their injurious influence. Hence *asthenic nephritis* often occurs in the course of *phlebitis*, especially of *uterine* and *traumatic phlebitis*, of the more acute forms of *tubercular consumption*, of *diffusive inflammations* of the cellular substance and of *diffusive abscesses*, and after the rapid absorption of purulent matter from the more *chronic abscesses*, especially from *abscesses of the liver*. — In these cases, various changes in the urine have been observed. It has been generally alkaline, often puriform or muco-puriform, thick, scanty, and ultimately suppressed; a morbid state of the perspiration, adynamic fever, sopor and coma, with other typhoid and malignant symptoms appearing towards the close of life. — In some cases a large quantity of pus, with some mucus, is voided in the urine, shortly before the affection of the kidneys supervenes; but as it becomes fully developed, so pain in the loins, scanty, painful, and frequent micturition, with the other symptoms of nephritis are observed, and precede the sopor and other typhoid symptoms, which are the consequence chiefly of the partial or total suppression of urine caused by the consecutive nephritis. — *On dissection* the kidneys generally are found containing, in their vascular and tubular structure, small collections of pus; the structure immediately surrounding these being softened, of a dark or brownish hue; or paler, especially in patches, and infiltrated with purulent matter. Occasionally the tubular structure seems filled with pus; and, in rarer instances, the renal veins have been found inflamed.

56. *d. Nephritis is often consequent upon the eruptive fevers*, more particularly upon *scarlatina* and *small-pox*. Its connection with *scarlatina* is of two kinds: — 1st, it may appear in the course of this fever; and 2d, it may not take place until the fever has subsided, or until the advanced progress of convalescence from it. — (*a*). When it occurs in the *course* of scarlatina, it generally assumes very nearly the same features as have been noticed in connection with *typhoid fevers* (§ 7.), and is extremely acute, the urine being either suppressed, or very scanty, dark-coloured, bloody, or abounding in blood-globules, albuminous, and passed frequently, in drops merely, or in very small quantity and with much pain. These attacks of nephritis are either consequent upon a premature disappearance of the eruption, or on an imperfectly developed state of it; or it complicates the more malignant states of scarlatina, and causes its rapid termination in coma, &c. — (*b*). Where nephritis appears during *convalescence* from scarlet fever, it is more frequently of that particular kind, which has been called *albuminous nephritis*, or *granular degeneration* of the kidneys, and which I have viewed, since it was first described by Dr. BRIGHT, as a form of inflammation of these organs; and as such it has also been recently considered by M. RAYER. When this state of disease is discussed, then its connection with scarlatina will be fully noticed.

57. (*c*). *Asthenic nephritis* also occurs during *small-pox*, particularly its confluent and malignant forms. In these cases, the urine is very scanty, alkaline, muco-puriform, or bloody and sometimes nearly black; or it is altogether suppressed. When this complication of small-pox takes place, all the characters of the disease assume an aggravated or more malignant character, coma and other typhoid symptoms supervening. *After death*, the kidneys are found congested, ecchymosed, partially softened, of a dark hue, and, in rare instances, infiltrated with purulent matter.

58. *e. Nephritis is often consecutive of paraplegia*; and the influence of this state of *palsy* in causing it, is remarkable, whether the paraplegia proceed from injuries or from diseases of the spine or spinal chord. Nephritis may also be consequent upon *coma*, especially in low fevers, as above mentioned; whilst in these maladies, it more commonly produces or aggravates this and other adynamic symptoms than is supposed. When nephritis appears in these cases, it usually proceeds from retention of urine, and the changes caused by this retention; for it rarely takes place

when accumulations of urine are prevented. Probably, however, the loss of that portion of nervous power supplied to the urinary organs by the spinal chord, has some influence in predisposing to inflammation of the kidneys; and in imparting an asthenic character to the disease, which, in these circumstances, is attended not only by retention of the secretion, but also by a very alkaline, offensive, or ammoniacal state of it, indicating the existence of disease of the bladder. Indeed the alkaline, or ammoniacal, or offensive odour of the urine in these cases, arises from the partial decomposition of the mucous and other animal matters in it, whilst the urine is retained in the pelvis of the kidney and in the bladder. In these cases the *structural changes* in the kidneys are nearly the same as are met with after other consecutive inflammations of these organs, as already described.

59. *f. Nephritis is often consecutive* of prolonged disease seated in the *urinary bladder*, or in the *prostate gland*, or *urethra*. The frequent and continued irritation of the *urinary bladder* from inflammatory action of its mucous membranes or of its mucous follicles, may occasion congestion or inflammatory action of the kidneys, owing to the intimate connection depending on function, and nervous communication. Disease of the *prostate gland*, when of long duration, or when it interrupts the discharge of urine, is also apt to be followed by inflammation of the kidneys either with or without calculous formations or gravel, these latter more frequently occurring in the gouty diathesis in connection with the prostatic disease. The pressure also of *stone* in the bladder, by the irritation it occasions in this viscus, and in the neck of the organ and prostate, in connection with the interruptions it produces to the free discharge of urine, often gives rise to inflammation of the substance, as well as of the pelvis of the kidney. In some of these diseases, the morbid action seems to extend from the bladder along the ureters to the kidney, as shown by the inflammatory action and its consequences observed in one or both these ducts. *Strictures of the urethra*, more especially where they produce retention of urine, are not infrequently followed by acute or chronic nephritis. As respects all circumstances, in which the disease appears consecutively of disorder or structural change of some other portion of the urinary passages, it should be recollected that it is often chronic, sub-acute, slow, and insidious in its progress; that it requires close and careful examination of the physiological symptoms, and of the appearances and states of the urine, to detect it; and that its progress, as well as its accession, is often masked by the symptoms referred to the bladder, urethra, and perinæum, where they are most severely felt, as well as by those attending the excretion of urine. When nephritis is thus superinduced, its indications are to be found chiefly in connection with the seats of primary disorder, with the powers of retaining the urine, with the frequency of passing it and the quantity passed, with appearances and characters, and with its partial or total suppression or retention.

60. iii. Of the influence of Inflammation of the Substance of the Kidneys in producing other Maladies. — This subject was imperfectly noticed until Dr. Bright directed attention to it in his researches in the *granular degeneration* of these organs. The consequences which arise from this particular state of disease will be stated hereafter. I shall confine myself chiefly at this place to the consideration of those which more immediately proceed from the states of nephritis already brought under consideration. It must be manifest that, where inflammation attacks those structures which are more especially concerned in the performance of the functions of the organ, that the discharge of these functions must be remarkably disturbed. It is well known that, like other glands, when the kidneys become inflamed, they experience a remarkable impairment of their functions. The membranes which surround them and support them, have the effect of compressing them, especially when their vessels are injected, congested, and inflamed, thereby increasing their incapability, arising from the inflammatory state, of performing their usual offices. The deposition, also, of coagulable lymph, either in considerable patches, or as an infiltration of the textures, further increases the pressure on the vascular and tubular structures, and otherwise interrupts the eliminating action of these organs. Whether, however, impairment, or interruption, or suppression of the functions of the kidneys be thus or otherwise produced, there can be no doubt of either the one or the other of these being the consequence of developed inflammation of the proper structures of these organs. Owing to this change — to this interruption — the fluid and saline matters requiring elimination from the blood accumulate in it, and the vascular system experiences a state of excrementitial plethora, giving rise to impairment of vital energy, to congestions of other viscera, and to effusions into shut cavities and cellular parts. During the earlier stages of this vascular disorder, and before the blood becomes so impure and so watery as to overpower the tone and reactive energy of the vessels, and hence to occasion congestion and loss of function of vital organs, a vicarious elimination of a portion of the injurious materials accumulated in the blood, takes place by means of the skin and digestive mucous surface, and in the form of aqueous vapour from the surface of the bronchi and air-cells. At last, however, if the functions of the inflamed kidneys are not restored, the brain becomes congested and oppressed, and serum is effused in the ventricles, and between the membranes. Hence the *sopor* and *coma* which occur in the last state of unfavourable cases of nephritis, and which supervene the more rapidly the more abundant and the more impure the blood has been previously to the occurrence of nephritis, as in the consecutive forms of the disease just considered.

61. Even when a vicarious action is exerted by the skin and mucous surfaces during inflammation of the kidneys, yet these are incapable of evacuating several or all of the elements or materials requiring excretion from the blood, and of combining them into those forms which facilitate their discharge. The blood, therefore, must become, not merely loaded with these materials, but further changed, and even rendered morbid or noxious, by the influence they exert upon the hæmatozine or principal constituents of this fluid. Hence a state of actual cachexia, of a most acute and malignant nature, particularly in respect of its consequences, is developed, the soft solids are ultimately universally contaminated, and the body experiences a rapid dissolution as soon as life

departs. During the progress of these changes in the blood, produced by the accumulation in it of aqueous and effœte matters, various local diseases may appear as consequences of this excrementitial plethora, and contribute to hasten a fatal result, or concur with others in producing it; or these consecutive maladies may subside, if they be not severe, upon the removal of the inflammation, and restoration of the functions of the kidneys. Thus diseases of the *digestive organs*, particularly of the *liver*, *asthenic inflammation* of the *lungs*, of the *brain*, of the *endocardium*, and of the *veins* or *arteries*, and *dropsical effusions*, may appear as results of the action of the impure and morbid blood on these organs. *Dropsy*, however, unless the more acute states of it and sudden effusions of serum, does not appear as a consequence so frequently of the inflammations of the kidney already considered, as of the more chronic and peculiar form of disease first described by Dr. BRIGHT.

62. Various other important consequences follow nephritis, and arise rather from the intimate connection subsisting between the kidneys and the parts consecutively affected, through the medium of nervous association and relations, continuity of surface, and intimate consent and connection of function. Many other diseases of the urinary and sexual organs proceed from a primary disorder of the kidney, more especially when such disorder is connected with the formation of gravelly and calculous substances, and with inflammatory irritation of the calices and pelvis of the organ; but to these a stricter reference will be made in the sequel. As to the part performed by slight or partial inflammatory action in the substance of the organ, in giving rise to the formation of gravel and calculi in the kidney, it is difficult to decide. It is not improbable that it may favour these deposits by obstructing the free passage of the urine along the tubuli; but there is much more reason to infer that these deposits take place, independently of pre-existing inflammatory action, from the superabundance in the blood of the elements or materials constituting them; and that when inflammation does occur, that it is rather a consequence than a cause of their formation, — that they proceed in the first place from impaired power of the digestive functions, in connection with an excessive supply of the articles of food abounding in the chief elements of which they consist, and consecutively of impaired action of the kidneys, probably sometimes in connection with partial congestions or inflammations.

63. iv. COMPLICATIONS OF NEPHRITIS. — It is obvious, even from what has already been advanced, that inflammations of the vascular and tubular structures of the kidneys will both supervene in the course of other maladies, being thus consecutive, and give rise, when it is primary, to various important changes in the economy, both of a local and of a constitutional kind. Owing to these circumstances, nephritis will often present itself in practice, as an *associated* or *complicated malady* — most frequently — 1st. With inflammation of the mucous membrane lining the calices and pelves of the kidneys; — 2d. With gravel or calculi in the substance or pelvis of the organ; — 3d. With inflammation of a portion, or of most of the investing membranes; — 4th. With disease of the ureters; — 5th, with disease of the bladder and prostate gland; — 6th, with stone in the urinary bladder; — 7th, with stricture in the urethra; and 8th, with any two or more of these. As already shown, the disease may be *further complicated* with one or other of the diseases, upon which it occasionally supervenes, or which it sometimes produces or developes. It is obvious that these associations of nephritis cannot receive a more particular notice at this place. To several of them attention will be paid hereafter; and others of them are fully treated of in the article URINE, URINARY BLADDER, and URINARY CALCULI.

64. v. PROGNOSIS. — The prognosis entirely depends upon the *progress* that nephritis has made, upon the nature of the *predisposing* and *exciting causes*, upon its *severity*, upon the *age* of the patient, and upon the circumstances of its being a *primary* and *uncomplicated malady*, or *consecutive* of, or *complicated* with, some other disease, either of the urinary organs or of some other viscus. The simple states of nephritis, particularly when occasioned by cold and humidity, or by turpentine or cantharides, generally yield to judicious treatment; but when the disease is consequent upon other affections of the urinary organs, or upon operations on any of these organs, or when it occurs in aged persons, or when it is so severe as to be attended by suppression of urine, or by incontinence of it, the prognosis should be unfavourable, or at least be given with caution and reservation. The prognosis ought also to be extremely unfavourable, when the disease occurs in the course of low, adynamic, and exanthematous fevers, or when it is productive of sopor or coma, or when any of the more important changes, either in the blood or in other organs, which it has been shown occasionally to cause, is unequivocally manifested. The occurrence of retention, or of suppression, of urine, in aged persons, who have been the subject of incontinence of it, or of the more chronic symptoms of urinary disease; or the supervention of the acute attack, upon a slight or chronic state of the malady, is always most dangerous. In every instance, when the symptoms indicating the accession, or the presence, of suppuration, abscess, or of any other unfavourable consequence of nephritis, are manifested; or even when the disease has not yielded to a judicious treatment within the period assigned to the acute form of the malady; when the urine becomes alkaline, offensive, and purulent, as well as scanty, and the perspirations are urinous and copious, the constitutional symptoms indicating depression of the powers of life, obscuration or oppression of the cerebral functions, and contamination of the circulating fluids; and when a severe attack of nephritis occurs in the advanced progress of disease of some other organ, or of low or exanthematous fevers, then a most unfavourable prognosis of the result should be given.

65. When disease, also, of the bladder supervene on a chronic affection of the kidney, owing to the morbid state of the urine; and more especially if suppuration occur about the neck of the bladder, in consequence of irritation, inflammation, or other lesion of the kidney, a very dangerous state of disease is present, more particularly when it occurs in aged persons, or in those who have been subject previously to disorder of the digestive or urinary

organs. In these cases, the disease of the one organ reacts upon the other, and thus both are aggravated to a most dangerous extent.

66. vi. TREATMENT. The treatment of nephritis is subordinate to the causes, particular form, complication, and state of the disease, to the progress it has made, and to the age and constitution and previous ailments of the patient.

67. *A. Treatment of primary and simple Nephritis.*—*a.* When the disease proceeds from a concussion, sudden jerk, contusion, injury, or wound, early and even repeated *bloodletting* ought to be then especially prescribed, and the patient should be restricted to an antiphlogistic regimen; *diluents* and *demulcents* being allowed in small or moderate quantity. Of these, linseed tea, barley water, the *mucilages*, the usual *emulsions*, &c., are the most appropriate. Anodyne or opiate *fomentations* or *poultices* may be placed upon the loins; and the patient may have recourse to a tepid, emollient, or slightly warm bath, on the following day. If the pain and other symptoms continue notwithstanding this treatment, or if they be only partially removed, or if symptomatic fever is still considerable, more blood should be taken away; and it may be taken by cupping or by leeches—the former being the preferable mode; but the quantity should be prescribed without reserve, for too copious vascular depletion is less injurious in this disease than in most others, and much less so than a too sparing recourse to this measure. The smallness or contraction of the pulse should not deter from copious bloodletting, especially if the local and symptomatic pains are severe, and if retching or vomiting are frequent. In these cases, the pulse will become fuller and more developed by depletion.

68. (*b*). M. RAYER remarks, that, if the inflammation is caused by a *wound* of the kidneys, and the fever has been subdued, and the pain is inconsiderable; and if the discharge of some pus in the urine indicate the supervention of suppuration, bloodletting should be abstained from, and a severe regimen and regular dressings of the wound prescribed. If the suppuration is prolonged, the diet ought to be more generous, as a certain degree of power is favourable to recovery; whilst too great severity of regimen may retard recovery, and is only applicable when the injury or wound has extended to the peritoneum, or has complicated the nephritis with enteritis or peritonitis.

69. (*c*). When nephritis is caused by cantharides, by turpentine, by iodine, or by acrid diuretics, in too large doses, or too long employed, and the disease is slight, a moderate bloodletting, demulcents, and tepid baths soon remove the disease. If the symptoms, however, persist, these means should be carried still further, according to the circumstances of the case. Camphor has been recommended when the disease has been caused by cantharides; but it should not supersede bloodletting. It is an excellent adjuvant of other means, particularly when conjoined with oleaginous, mucilaginous, or demulcent substances, and given in small or moderate doses.

70. (*d*). Nephritis, caused chiefly by *cold* and *humidity*, in strong, young, or plethoric persons, requires an active recourse to general and local bloodletting, and the antiphlogistic and emollient means above advised. If the symptoms are merely abated, cupping, or a repetition of it, over the loins, must be prescribed, and demulcents taken by the mouth and administered in enemata. For nephritis from this cause, tepid or gently warm baths, and sudorifics conjoined with emulsions and anodynes, are especially indicated. In this, as well as in other states of the disease, the *bowels* should be kept in an open state; and, for this purpose, castor oil, or sweet oil, or both, may be prescribed and administered in demulcent vehicles. In some cases, after the disease has been, even for some days, apparently subdued, chills or rigors return, followed by pain in the loins, febrile reaction, and other symptoms of a recurrence of inflammation. When this is observed, a large bloodletting ought to be prescribed, unless the patient be far advanced in life; and, in this case, cupping on the loins, and the abstraction of eight, ten, or twelve ounces of blood, may be sufficient. When the symptoms lead to the inference that the *investing membranes* are chiefly affected, then the depletions should be copious, and calomel, with antimonials, or with other diaphoretics, ought to be freely prescribed.

71. (*e.*) *Sub-acute nephritis* requires a similar treatment to that above advised; but vascular depletions need not in general be carried so far as in the acute form. One large cupping over the loins may be sufficient; but it will often be necessary to repeat it; and, although this state of nephritis may not be so severe, it may be more obstinate than that already considered, and when both kidneys are affected, the treatment should be more energetic. The other means just mentioned are also appropriate in this state of the disease; or the diet and regimen should not be materially different from that directed for the acute form. The use of animal food, and of fermented and spirituous liquors, ought to be especially avoided.

72. (*f*). *Chronic nephritis* is often removed with much more difficulty than the acute attack; for, as it often has proceeded far before it has come under treatment, and is frequently caused and perpetuated by calculi in the kidney, the most judicious means may produce only temporary benefit. It is generally rendered more obstinate by the continuance of the habits and modes of living usually pursued by the patient during the treatment, notwithstanding the injunctions of the physician to the contrary. Generally one or two cuppings on the loins, with the antiphlogistic regimen, aided by a strict avoidance of animal food, and of exciting beverages, will remove the disease, or very remarkably ameliorate it, even when calculi have produced it; but farther measures are often necessary, particularly when it proceeds from this cause. Having, in such cases, carried vascular depletions and other antiphlogistic means as far as may seem prudent, some permanent external derivative will be requisite, in order to supersede the irritation still existing in the kidneys. *Issues* or *setons*, in the loins, or in the insides of the thighs, kept freely discharging for a considerable time, and the internal use of the preparations of the *diosma*, or of the *uva ursi*, with demulcents, with alkalies, or with acids, especially the muriatic or nitro-muriatic, according to the state of the urine, which ought always to be carefully and even chemically examined, are often the most beneficial means which can then be advised, particularly if they be aided by a suitable diet and regimen.

73. If either the *sub-acute* or *chronic* states of the disease suddenly assume an *acute* or *hyper-acute* form (§ 14—17.),—a circumstance by no means uncommon, — the means advised for acute nephritis (§ 67—70.), ought to be most promptly and energetically employed.

74. *B. The Treatment of the Modified and Consecutive Nephritis* (§ 46. *et seq.*) necessarily varies with the diathesis of the patient, and with the disorders or maladies occasioning it.—*a. Nephritis in the Gouty Diathesis* (§ 47.) is generally removed by *cupping* on the loins, and abstracting *blood*, according to the age, strength, and habit of body of the patient; by derivatives applied to the lower extremities; and by diluents or demulcents containing some one of the alkalies or alkaline earths, and anodynes. Magnesia or soda, with colchicum, or these with cathartics or purgatives, a vegetable or bland diet, attention to the digestive functions, and avoidance of heating and exciting ingesta, are also of great service.

75. In robust and plethoric persons general bloodletting is often necessary at the commencement of the treatment; and when the inflammatory action is perpetuated by the irritation of calculi or of gravelly matter, local depletion should be repeated, and demulcents, combined as above, should be assiduously employed. When the disease passes into a *chronic form*, the treatment recommended for *chronic nephritis* (§ 72.) ought to be prescribed, and the infusion of *Pareira Brava*, or of the *diosma crenata*, aided by the alkaline mineral waters and external rubefacients, freely employed. When gravelly or chrystallised substances are voided, or when their presence in the tubuli uriniferi is inferred, these remedies and the means already advised should be persisted in for a considerable time. This form of nephritis is not readily removed when it assumes a chronic form in old gouty subjects, or when it has been neglected in an early stage or in previous attacks. In these cases more especially, much attention is requisite to diet and regimen, and to the state of the evacuations. The biliary secretions should be promoted, and the bowels kept freely open by stomachic purgatives and moderate doses of the milder preparations of colchicum. When the stomach is irritable and flatulent, or when nausea and vomiting occurs, *creasote*, with small doses of opium, and with magnesia or some alkaline preparation, in demulcent and aromatic mixtures, is often extremely serviceable.

76. *b.* Rheumatic nephritis (§ 50.) has been shown above to be so obscure in many cases, as to render it difficult to determine how far the kidneys are really affected. When, however, the symptoms particularised above are present, there can be little doubt of those organs being *acutely*, or *sub-acutely*, or chronically inflamed; and still less of the propriety of having recourse to cupping on the loins, to demulcents and diluents; to the infusion of *diosma* or of *Pareira*, or to the decoctions of marsh-mallows, of guaiacum, of senega, &c., with alkalies, with colchicum, &c. When the attack is severe and the patient is strong or plethoric, general bloodletting should precede the cupping on the loins, and external derivatives, particularly to parts previously the seat of rheumatism, ought to be applied. The turpentine embrocation may also be prescribed to the loins, and morbid secretions and fæcal accumulations duly evacuated.

77. If any dread of the occurrence of *endocarditis* or *pericarditis* be reasonably entertained, camphor may be given with mercurials and opium, or the decoction of senega or of guaiacum, may be taken with alkalies, anodynes, &c., and external derivation by means of open blisters, issues or setons, or by rubefacients, assiduously employed.

78. *c.* For *Secondary* or *Consecutive Nephritis* (§ 52.), the treatment must depend chiefly upon the states of vital power, of vascular action, and of the circulating fluids. In proportion as the vital energy is depressed or sunk, and the blood contaminated, and as the disease consequently assumes an *asthenic* character, so should vascular depletion, even locally, be resorted to with caution, or be altogether withheld. In these cases, the capillary circulation of the kidneys is interrupted, the vessels are congested and incapable of reacting upon their contents, and the secreting function is impeded or altogether suppressed. In these circumstances, although local depletion, especially cupping on the loins, may partially unload the weakened and congested vessels, yet it cannot restore the nervous or vital power of the kidneys so as to enable them to perform their functions. We often find in the more severe of these consecutive states of nephritis, the secretion of urine altogether suppressed and both organs affected, particularly when occurring in the course of continued or eruptive fevers, or after the absorption of morbid secretions into the blood, or after injuries of the spine. When this is the case, but little benefit results from cupping on the loins or from other modes of vascular depletion, unless means be used at the same time to rouse the action of these organs. The choice and application of these means are, however, amongst the most difficult things in practical medicine. Indeed the practice in these circumstances can only be experimental, endeavouring, however, to suit the remedies to the pathological states inferred to exist at the time of prescribing them, and to the sensible qualities of the urine. In most of these cases, especially when the disease is consecutive of *paraplegia* (§ 58.), or *coma*, the urine is more or less alkaline, and is probably secreted in this state, although the partial decomposition or change of the mucus secreted by the urinary mucous passages may further increase it. The mineral acids, particularly the *hydro-chloric*, conjoined with *hydro-chloric ether*, and given in tonic, antiseptic, and restorative vehicles, seem to be the most appropriate medicines to these cases. *Camphor* may also be tried in conjunction with nitre or the chlorate of potash; and embrocations containing this substance and the spirits of turpentine may be applied on the loins; or this latter may also be given internally in small doses, with the view of exciting the nervous energy of the kidneys and the action of the congested vessels. When, however, the patient is plethoric or robust, and vascular action and tone are not remarkably reduced, the abstraction of blood from the loins by cupping should precede the use of the above remedies, and should be carried as far as the states of vital power and of the circulation may permit. When vascular depletion cannot be further prescribed,

dry-cupping on the loins may still be had recourse to.

79. For the form of asthenic nephritis which sometimes occurs in the course of low fevers, or in consequence of the absorption of morbid secretions into the blood (§ 53—57.), the remedies now recommended may be tried, particularly dry-cupping, camphor, the chlorate of potash, the chlorides, hydro-chloric acid and ether, nitre and the spirits of nitric ether, stimulant and rubefacient embrocations and blisters on the loins, or other derivatives; but little dependence can be placed on medicines when this state of the disease is attended by a total suppression of the urine, as observed in the worst cases of it, and more especially if coma or convulsions have taken place.

II. CACHECTIC NEPHRITIS. — SYN. *Granular disease of the kidneys; Renal disease accompanied with secretion of albuminous urine*, Bright. *Diseased state of the kidneys connected with albuminous urine*, J. Gregory. *Granular degeneration of the kidneys*, Christison. *Albuminuria*, Martin-Solon, Willis. *Morbus Brightii, Maladie de Bright*, Auct. var. *Nephrite albumineuse*, Rayer. *Nephritis cachectica, N. sociata, Associated Nephritis, Nephritis from constitutional vice, Nephritis from a morbid state of the blood, Inflammation of the Malpighian corpuscles*, Author.

80. DEFIN. — *Uneasiness or pain in the loins, pallid or cachectic appearance of the countenance, disorder of the digestive functions, more frequent calls to void urine than natural, this fluid containing albumen, and being of less specific gravity than usual, owing to a diminution of its salts and of urea, dropsy or some visceral disease appearing in connection with the morbid states of the urine.*

81. PATHOL. CHARACT. — *A morbid state of the blood, characterised chiefly by the presence of urea and deficiency of albumen, and of hæmatosine, in connection with lesion of the circulation, minute glandular bodies, and structure of the kidneys, with various organic changes in other viscera, and generally with serous effusion into the cellular tissue and shut cavities.*

82. A general idea may be formed from the above definitions of the view I intend to take of this disease, which has attracted much attention since it was discovered by Dr. BRIGHT, yet not more attention than its real importance deserves. Although medical writers of high authority have fully investigated this malady, still certain topics connected with both its pathology and its treatment, the particular tissue of the kidneys primarily affected in it, require further elucidation. Indeed, the connections subsisting between it and morbid states of the blood, and between it and many visceral maladies, still require a full exposition, and to these topics further notice will be directed in the sequel.

83. i. DESCRIPTION. — Cachectic nephritis assumes two forms, the *Acute* and the *Chronic*, the one gradually passing into the other, although sometimes sufficiently distinct, in respect of the course of individual cases, to warrant this distinction, which has been made by both Dr. CHRISTISON and M. RAYER. The *acute* form is frequently *febrile*, or attended by marked vascular reaction; the *chronic* is *non-febrile*, and although the pulse may be accelerated, it is usually compressible or soft, or even small and weak. The *symptoms* may be *acute* at the commencement, but pass into those of the *chronic* in the course of the disease; and after having thus assumed the chronic state, exacerbations of febrile states may occasionally take place: but in either form, especially in the chronic, it may present a variety of aspects — numerous modifications — according to the previous circumstances, disorders, or predisposition of the patient, and to the various affections either associated with it at its commencement, or appearing in its progress.

84. *A. Symptoms of Acute Cachectic Nephritis.* — This form of the disease is frequent among children after scarlatina, especially during certain epidemics, and also in adults after exposure to cold and humidity, and to sudden changes of temperature; but is much less common than the chronic. It often is ushered in by shivering or chills, followed by the usual symptoms of fever, particularly a hard pulse, heat and dryness of the skin, and restlessness. A dull aching or pain, or a sense of uneasiness or of weight, or of constriction, is always felt in the loins, sometimes more in one side than in the other: but M. RAYER believes that these feelings are never so severe as in simple nephritis; nor are they attended by retraction of the testes, nor by pains darting in the direction of the ureters. Dr. CHRISTISON, however, has observed, in some cases, pain extending down the inside of the thighs and to the genitals. At the same time with the occurrence of these symptoms, the *urine* quickly becomes scanty, occasionally nearly suppressed, highly albuminous, and occasionally even bloody, or of a reddish colour, resembling the washings of fresh meat. It is always acid; and its specific gravity is often above, seldom below, that of healthy urine, the proportion of urea and of the saline ingredient not being materially altered, according to M. RAYER; but such is the case only at the commencement of the disease. When allowed to rest, the urine deposits a filamentous substance, apparently of a fibrinous nature. The odour of the urine is feebly urinous; but at the end of twenty-four hours it resembles that of beef-soup. When the albuminous and sanguinolent urine is first voided, it may be seen, by aid of the microscope, suspending a number of blood-globules, also the globules of mucus and minute lamellæ of epithelium; all which, with the fibrinous substance, forms a sediment when it is left some time at rest. There is frequently distress, or even pain, in voiding the urine, occasioned by sympathetic irritation of the bladder and urethra, increased by the difficult passage, in some cases, of the fibrinous substance along the urethra; and the calls to pass it are more frequent than usual. The quantity of urine is much less than that of fluids taken. There is always more or less fever. The tongue is furred or loaded, and the bowels confined. Nausea and vomiting occur, sometimes with pain across the epigastrium, and cough is occasionally present.

85. Very soon after these symptoms have been developed — generally within twenty-four or forty-eight hours — signs of *dropsical effusion* appear, and proceed with great rapidity, affecting first the eyelids and whole face, or the limbs, and extending to the other parts of the body. The skin is hot, end does not pit, unless after very firm pressure. If *blood* be drawn at this time, it is always buffy, — sometimes very remarkably so, and the serum is occasionally milky. At the commencement of the

disease the serum coagulates nearly as in health, but in a very few days the coagulum furnished by the serum is much less firm, and this fluid becomes specifically lighter. The greater the quantity of albumen in the urine, the lower is the specific gravity of the serum; and as the albumen becomes less abundant in the urine, so the density of the serum increases. According to the researches of Dr. CHRISTISON, urea may be detected at an early stage of the disease in the blood.

86. The *terminations* of the acute form of the malady are — 1st, In restoration to health; 2d, In the chronic state; 3d, In coma, or convulsions, or both; 4th, In pleurisy, or in inflammation of some other serous surface; and in death, usually preceded by one or other of these more acute affections. — *a. Recovery* often takes place rapidly under judicious treatment, especially after scarlatina or during pregnancy; and is commonly indicated by profuse and general perspiration, by a copious discharge of urine, by a diminution of the albumen, and increase of the urea and salts in the urine, and by a subsidence of the febrile symptoms and of the anasarcous swellings. — *b.* The *chronic state* is generally shown by the subsidence of the febrile and acute symptoms, and often of the anasarca; the urine, however, still continuing albuminous. — *c.* The occurrence of *coma*, or *convulsions*, or of both, is generally a fatal indication. — *d.* The appearance of *pleurisy*, *pneumonia*, or *pericarditis*, or of any other visceral inflammation, or of *effusions* into shut cavities, is always a dangerous circumstance, and even in their milder states renders recovery protracted or even doubtful, especially if the urine still continue albuminous.

87. *B. Symptoms of Chronic Cachectic Nephritis.* — This form of the disease is sometimes consequent upon the acute, but it is incomparably more frequent without any febrile or active stage — latent and obscure in its origin; and it is a very much more common malady than the acute. It generally occurs in persons of an original or an acquired constitutional taint, or in those whose vital powers have been depressed or exhausted, and their assimilative functions and circulating fluids deteriorated, by previous disorder (§ 141.), or by exhausting, depressing, or other injurious circumstances, as exposure to cold and humidity, insufficient or unwholesome nourishment, &c. For a long period, there is no disorder sufficiently severe to withdraw the patient from his usual occupations, or even to attract particular notice, until gradually increasing debility, or an unhealthy or pallid countenance, alarms him or his friends, and then, if the medical adviser is alive to the nature and frequency of the malady, the urine is found specifically lighter and more or less albuminous, its solid ingredients being deficient. Not infrequently, almost contemporaneously with, or rapidly consequent upon, debility, pallor of countenance, or still more manifest cachexia, some serious visceral disorder or disease is developed, and proceeds *pari passu* with, or even outstrips, the renal malady and the symptoms by which it is indicated. Dr. CHRISTISON remarks, that, in cases apparently the most obscure in their origin, the urine has been very long scanty, or on the other hand too abundant, or occasionally of a cherry-red colour from a little blood, — or that it was passed frequently, and with difficulty or with pain, — or that there were frequent gnawing pains in the loins or flanks, extending at times to the thighs or groins. He further remarks that no symptom is so invariable, or indicates so truly the commencement of the disease, as the patient being regularly awakened once or oftener in the night by the call to pass water.

88. The disease may thus advance in obscurity, particularly in scrofulous persons, for months or even for years, until either the state of the urine attracts attention, or some incidental cause aggravates the disease, or renders it more acute, or developes a partial or general anasarca, or some associated or secondary malady. It is, however, generally indicated by reduction of strength, slight emaciation, by pallor or sallowness of the countenance, by a dry state of the skin, and want of perspiration during exercise, a frequent tendency to drowsiness, various dyspeptic symptoms, or a weakness of digestion, and occasionally sickness or even vomiting in the morning or when first awakening from sleep, slight thirst, and the other symptoms above mentioned (§ 87.). The countenance presents an uniform paleness, or a pale dinginess, which becomes more marked, and attended by manifest anemia, as the malady advances. The altered state of the urine and of the blood, the dropsical effusion, and the unhealthy complexion, are the most invariable and characteristic symptoms, and require a more particular notice.

89. *a.* The *urine* when first passed is generally slightly acid, but in a few cases it is neutral, or even alkaline. It is always pale in the advanced or chronic stage, sometimes more or less opaque, or like whey, suspending small whitish flocculi. Its odour is faint, and very different from that of the healthy secretion: its specific gravity is generally below, sometimes very considerably below, that of the urine in health. The want of transparency is occasionally owing to fatty matter held in suspension, which may be removed by means of sulphuric ether, when the urine becomes clear. Examined by the microscope, albuminous urine generally exhibits numerous small thin lamellæ of a whitish colour, often blended with mucous matter, which is either amorphous or in the form of globules. A vessel containing this urine usually presents on its sides or on the surface of the fluid a number of bubbles; and when air is blown through a tube into it, a multitude of large bubbles are formed. The application of heat forms in it an albuminous coagulum, or small coagula, which are remarkable in proportion to the quantity of albumen. Nitric and other strong acids, and a solution of the bichloride of mercury, produce a similar effect. The yellow cyanuret of potassium and iron also coagulates albuminous urine, if it has been previously acidulated with acetic acid. A sediment sometimes forms after it has been passed, which is commonly lithic acid or the lithate of ammonia, and which is re-dissolved at a gentle heat, lower than what is required for the coagulation of albumen. Besides containing albumen, the urine deviates from the healthy standard in containing an unusually small quantity of its solid ingredients. This urine is also more prone, than healthy urine, to decay; a decidedly ammoniacal odour being occasionally soon developed after it has been discharged.

90. Dr. CHRISTISON remarks that this urine at the boiling point sometimes forms a gelatinous mass; more frequently it becomes a soft pulp like thin custard; often too, when the quantity of al-

bumen is less, there are distinct flakes in a separable fluid. The earlier the stage of the disease, the more is the urine loaded with these flakes, and the more does it form of a pulpy or gelatinous mass. Nitric acid acts in like manner; but it separates the albumen always in the form of flakes or pulp. It is advisable to use the tests both of heat and of nitric acid; for, if the urine be ammoniacal, heat may fail of coagulating the albumen although the proportion of it be considerable; and heat alone may occasion a flaky precipitate where there is no albumen, owing to the superabundance and consequent separation of earthy phosphates — a deposition which nitric acid will both prevent and remove. Also, nitric acid alone may occasion a flaky precipitate of lithic acid, which, however, is re-dissolved by an elevation of temperature, whilst albumen remains insoluble. To avoid all sources of error, the urine should be tested before it decays or becomes ammoniacal. In the early stage of chronic cachectic nephritis, the chief characters of the urine are, a moderate reduction of its specific gravity, a strong albuminous impregnation, and a material diminution of the daily discharge of solid ingredients — of the urea and saline substances.

91. As the disease proceeds, the albumen often is diminished in the urine, or even suddenly and for a time disappears. When it has made considerable progress, the quantity of urine is often but little reduced; frequently it exceeds rather than falls short of the healthy ratio; and in some cases, the amount has continued for weeks as much as double or treble that of health. But the quantity may be diminished either when the exciting causes develope an acute state of the disease in the course of the chronic, or when coma, stupor, or intercurrent inflammations take place, or when the granular degeneration has reached a certain or great extent. As disorganisation advances, the density of the urine sinks from about 1021 to 1026, which it usually presents at an early stage, to 1016, 1014, or 1012; and when it has proceeded far, the density is generally as low as 1010 to 1007, even although the quantity be rather under than over the natural standard. The lowest density which Dr. CHRISTISON has ever noted, where the quantity was not in excess, was 1004. A low density, he remarks, is an essential character of the urine in the middle and final stages, whether the quantity be great or small; and the density goes on diminishing as the disease advances. When disorganisation of the kidneys has proceeded very far, the albumen very frequently, if not generally, disappears altogether, and may not reappear unless acute symptoms occur. In this stage the chief characters of the urine are a great reduction of its specific gravity and an equal reduction of the daily discharge of solids — of urea, lithic acid, and salts, frequently associated with the presence of albumen in small quantity.

92. *b. Dropsical effusion* into the cellular tissue, or into shut cavities, or into both, generally takes place in the course of chronic as well as of acute cachectic nephritis; but the alterations of the urine described above may continue for many months before it appears, and without being attended by any disturbance besides debility, impaired appetite, and an unhealthy appearance of the countenance. However, if the patient be not carried off by some casual disease, or by some of the attendant or contingent maladies which so frequently complicate cachectic nephritis, he will certainly become dropsical sooner or later. Anasarca is the most common form of dropsy, the eyelids and face becoming puffy in the morning, and the ankles and feet œdematous in the evening. When œdema of the lower extremities is caused by this malady, it does not so readily or so entirely subside in the morning, as when it is produced by disease of the heart. M. RAYER justly remarks that nephritic anasarca is more sensibly and rapidly aggravated by exposure to cold air, than any other form of anasarca; and I have observed the chronic form of the nephritic disease suddenly changed into the acute by this cause, with a rapid increase of the anasarca, and with effusion into the serous cavities. Ascites not infrequently supervenes, especially when disease of the heart or liver is associated with disorganisation of the kidneys. Effusion into the pleuritic and pericardiac cavities, sometimes also occurs in the advanced stage of this malady. Urea is generally detected in the effused serum, besides albumen and the usual saline substances.

93. *c. The blood* undergoes remarkable changes in this malady, especially in the advanced stage, as Dr. CHRISTISON has very ably shown. I believe that this fluid is affected at an earlier period than is usually considered, and generally before any dropsical effusion takes place, if not before the urine itself, or even the kidneys, betray disease. This, however, cannot be readily determined; for the state of symptoms does not always indicate the propriety of bloodletting, and the patient rarely has recourse to medical aid at so early a period. The questions are, whether or no the changes in the blood are consequent upon, and caused by, those of the kidneys, or whether the latter depend upon the former, or whether both proceed either coëtaneously or successively from some other state of disorder. These must be adverted to hereafter; at present I must note only the alterations which take place in the blood in connection with this malady. The *serum* of the blood is reduced in density, has more or less of a milky appearance, and it contains less solid matters. The amount varies in different cases — from 1029 or 1031, the density of health, to 1022, 1020, or even 1019; and the solid contents being reduced from 100 or 102 in one thousand to 68, 64, or even 61. The reduction is considered by Dr. CHRISTISON to affect the albuminous equally with the saline ingredients. It occurs only where there is an abundant discharge of albumen with the urine; but then invariably, owing to the loss of albumen, the serum coagulates loosely when heated. This physician established as early as 1829 an important fact, which has since been confirmed by several writers, namely, the presence of a large quantity of urea in the blood. He states that urea is invariably found in the serum at all stages of the disease where the daily discharge of it by the urine is materially diminished, that is, to about one-third of the natural amount. Hence it may be discovered in the early stage if the quantity of urine have not been much increased by incidental causes beyond the common average at this period; but if the urine be thus increased it may not be detected, or traces of it merely.

94. The proportion of *fibrine* in the blood is commonly increased in the early stage of the chronic malady, although not so greatly as in the acute

form. Dr. CHRISTISON considers the quantity of dry fibrine to vary in healthy blood from 25 to 52 parts in ten thousand; but in the *acute* state or stage of the disease, he has seen it as high as 82, and as low as 30 parts, the variation apparently depending upon the degree of general vascular reaction or local inflammation which is present. The proportion of *hæmatosine* or of colouring matter he believes not to be materially affected at an early stage, when the patient has enjoyed good health previous to the attack; but such a state of health I consider rarely to exist just before cachectic nephritis is produced, — rarely before even the acute form of the disease; many of the supposed cases of this form, occurring in healthy persons, being actually cases of simple nephritis, which also is often attended by a slightly albuminous state of the urine. I have never seen a case of this malady in a person who was quite healthy just before its commencement. All that is known of the state of the blood in the *early stage* is, that the serum is deficient in albumen, and that it generally contains more or less urea; and that the proportion of fibrine is often increased.

95. *d.* As the *disease advances*, the blood presents much greater changes than the above: — 1st. It separates into a less bulky clot relatively to the quantity of serum, which is generally not so lactescent as in the early stage. The coagulum is also not so frequently buffed or cupped as in this stage or in the acute state; but it often assumes these appearances when general reaction or local inflammation supervenes. In many cases the clot is remarkably small and contracted, forming scarcely a fourth part of the whole weight of the blood. — 2d. The density and solid contents of the *serum*, which were much reduced in the early stage, gradually return to the healthy standard or even exceed it at a more advanced period, unless when reaction occurs, and when the urine becomes highly coagulable. In the most advanced stage where there is very little coagulability of the urine, the density of the serum may amount to 1030, and the proportion of the salts and albumen to the entire blood may be as high as 970 in ten thousand, the healthy standard being 780 to 800 according to LECANU, and 816 to 853 according to CHRISTISON. Where, however, reaction or inflammation has occurred in this stage, both the density of the serum and the proportion of the solids are greatly reduced. — 3d. The *urea* often disappears from the serum in the middle stage; but it commonly reappears in the most advanced stage, and is sometimes present towards the close in larger proportion than ever. This is owing chiefly to the quantity of urea and its combinations passed in the urine during the twenty-four hours, at these different periods of the disease. — 4th. The *fibrine* is usually in natural proportion after the early stage is passed, and becomes abundant only when reaction is produced and when the blood is decidedly buffy. Dr. CHRISTISON states it to vary from 27 to 43 parts in 10,000 as the malady proceeds, and from 56 to 85 parts where reaction or inflammation occurs, the clot being thickly buffed. — 5th. During the progress of the disease, the colouring matter, or *hæmatosine*, becomes gradually but rapidly reduced, and ultimately, if the patient be not carried off by some severe complication, it forms less than a third of the healthy average. In some cases the reduction is partly owing to bloodletting, but it is quite as great where no vascular depletion has been practised. On examining the blood with the microscope, the red globules are observed to be less numerous than in health, and mixed with them are seen other globules of a white colour and of a larger size than they. Dr. CHRISTISON observes that there is no chronic disease which so closely approaches hæmorrhage as this in impoverishing the blood. It thus appears that, in the advanced stage of chronic cachectic nephritis, the proportion of hæmatosine in the blood is invariably and greatly reduced: the other morbid changes are variable; the solids of the serum are most frequently defective, but sometimes in excess; and often, especially if the disease be very far advanced, the serum also contains urea.

96. The *leucophlegmatic* or sallow and bloodless state of the countenance, characterising the progress of the malady, is owing to the changes in the blood. A pale, transparent, waxy hue, is gradually induced; or a peculiar dingy or brownish tint, which is most frequently observed in persons of a dark complexion, although sometimes also in those who are fair; and readily suggests the probable existence of this malady when seen by the observing physician.

97. Besides the above changes and symptoms, there are generally a marked diminution of the perspiration, and more or less dyspnœa. There are sometimes also vomiting and diarrhœa. However profuse the latter may be, it rarely causes any sensible diminution of the dropsical effusion when this has taken place. The dyspnœa is generally owing either to bronchitis, to pulmonary œdema, or to hydrothorax, or to some other affection of the lungs or heart, which may have been antecedent to, contemporaneous with, or consequent upon, the renal disease.

98. *e.* The *duration* of chronic cachectic nephritis varies from a few months to several years. The time of its commencement is always ascertained with great difficulty, as patients frequently do not apply for advice until dropsy appears. Once the characteristic change takes place in the urine, some form or other of dropsy, generally anasarca, may be expected to occur, with much confidence, unless some intercurrent disease carry off the patient. When effusion does take place, it is impossible to say truly how long he may survive. In most instances, the dropsy continues until death — presenting, like the disease of the kidneys, remissions and exacerbations at longer or shorter intervals, or perhaps occasional amendments so considerable and so durable that the patient is enabled to attend to his affairs without interruption for months or even years; and until the disease, assuming a more active form, confines him to bed, and then terminates fatally more or less rapidly, in consequence of some secondary malady, as some cerebral affection, or pleurisy, pneumonia, pericarditis, gangrenous erysipelas, or obstinate diarrhœa, with or without vomiting and fever.

99. *C. Appearances of the kidneys after death.* — These appearances have been very fully described by the authors already mentioned, and especially by Dr. BRIGHT, Dr. CHRISTISON, and M. RAYER. The last-named writer describes *six forms* of organic lesion — *two* more especially be-

longing to the *acute*, and *four* to the *chronic* disease — presenting features more or less distinct or peculiar. But these forms of lesion may be found united in the same case, when the disease has attacked, successively and at longer or shorter intervals, different portions of the two kidneys. In almost every instance, both kidneys are affected, although very often unequally. In one case only have I seen the one organ very slightly altered when the other was very remarkably diseased.

100. *First Form.*—The size and weight of the kidneys are very much increased—from 4 ounces, their ordinary weight, to 8 or even to 12 ounces. Their consistence is greater, but they are not indurated; and their surface is morbidly red, and spotted over with a number of red points of a deeper colour than the rest of the organ. On dividing the kidney, the increase of bulk is found to be owing to tumefaction of its cortical substance, which exhibits numerous red spots similar to those visible on the surface, and which, according to M. RAYER, correspond to the glands of MALPIGHI, highly injected with blood. I have found these glands not only injected, but their central cavities either obliterated or filled with a whitish or yellowish granular matter, which I have considered to be albuminous in its nature. The tubular structure, compressed between the tumified prolongations of the cortical or vascular substance and the enlarged or tumid Malpighian bodies, is of a duller red, and its striæ are less apparent than in the healthy state. The mucous membrane of the calices and pelvis is sometimes injected, and exhibits vascular arborizations on its surface. This *first stage* of the disease is rarely observed as it seldom proves fatal until ulterior changes have occurred. It should not be confounded with congestion consequent upon disease of the heart or upon other maladies, nor with simple nephritis, in which latter the kidney is harder and redder, and almost always presents purulent points disseminated through its substance (§ 36.).

101. *Second Form.*—The volume and weight of the kidneys are still increased; but their consistence is not quite so great as in the first form. The lobules are more distinct than in health. The special character of this form is the very remarkable commixture of anæmia and hyperæmia, which gives a marbled appearance to the surface of the organs. On incision, the cortical structure is found still swollen, but it is now of a pale yellowish hue, spotted with red; and there is a marked line of demarcation between it and the tubular structure, the colour of which is reddish-brown.

102. *Third Form.*—The kidneys are still larger and heavier than in health; but they do not present any red patches or marbled appearances. The cortical substance, both on the surface and when divided, exhibits a tolerably uniform pale or whitish-red colour, passing into yellow; in some cases, it is still paler, and closely resembles the hue of the flesh of the eel. Minute vessels injected with blood appear here and there, and more rarely small brownish patches or large whitish granulations produced by an old deposition of lymph. The papillæ of the tubular structure often present red indurations; and the mucous membrane of the pelvis and calices is sometimes thickened and here and there injected; but these latter changes are also found in simple nephritis.

103. *Fourth Form.*—This form is what has been designated by Dr. BRIGHT the *granulated texture* of the kidneys. The size and weight of these organs are still increased. Their external surfaces, usually of a yellowish colour, are dotted, and sometimes covered with minute spots of a milky-white with a yellowish hue, which are often elongated, appearing as if small portions of milk curd had been irregularly spread over them. These granulations are generally most numerous and distinct at the two ends of the organ: they are not prominent, the surfaces of the kidneys being quite smooth, but are imbedded in the cortical substance. On dividing the kidney from its convex to its concave side, its cortical structure exhibits, as in the second and third forms, a pale yellow colour, which contrasts strongly with the red line of the tubular substance. The cortical structure is swollen, and occupies a considerably larger space than in health, particularly in its prolongation between the cones. The milk-white spots, or granulations of Dr. BRIGHT, instead of being rounded and distinct from each other, as they usually are on the outer surface of the organ, now appear like irregular flocculent lines, which seem to be continuous with the divergent striæ of the tubular cones. When the incision has been well made in the direction of these striæ, this arrangement is very distinctly seen, especially at the periphery of the kidney and the base of the cones, where the granular degeneration is generally most conspicuous. In some cases the granulations, although very distinct on the surface of the organ, can hardly be observed in the substance of the cortical structure; while in other cases they are scattered through every portion of it, even to the small prolongations which penetrate into the bases of the tubular cones. The granulations become distinct if the kidney has been macerated for some time in water; their dull white colour then stands out more obviously from the surrounding cortical structure.

104. *Fifth Form.*—The kidneys are larger, heavier, and have their lobules more distinctly marked, than in the healthy state. They appear as if a great number of minute grains of the semolina were sprinkled on their surfaces under their proper investing cellular membrane. These minute grains are Malpighian glands enlarged by albuminous infiltration, and are distinct from the yellowish particles sometimes observed in the cortical substance, which are also small granulations of lymph, accidentally met with in this and in other varieties of nephritis. This form of lesion is much more rare than the preceding; but, like them, are generally attended, during life, by dropsy.

105. *Sixth Form.*—This corresponds with the third variety described by Dr. BRIGHT. The kidneys are sometimes larger, but often smaller, than in the healthy state. They are hard, and more or less irregular and tuberculated. Few, or perhaps none at all, of the milky spots or granulations are observed on their surfaces; but a certain number is always found when an incision is made into the cortical structure. The surfaces of the organs are indurated, corrugated, and mamallated; but, although studded over with minute asperities, they do not exhibit the genuine granulations of BRIGHT. In some cases, how-

ever, the anatomical characters of this form of the disease are so closely alike to those observed after simple chronic nephritis (§ 22.), that it would be scarcely possible to point out the distinction between them, if the phenomena present during the life of the patient were not taken into the account. In this advanced stage of the disease the investing membranes are almost always thickened, at least in several points, and strongly adherent.

106. The other changes of structure sometimes observed in connection with the above forms of lesion are neither very remarkable nor necessarily connected with them. They may occur in any of the varieties of nephritis. Alterations of the ureters, urinary bladder, prostate and urethra, are merely coincidences, and are sometimes observed. But extensive changes of the lungs, heart, stomach, intestines, liver, serous membranes, &c., are very often found in addition to those existing in the kidneys, and are either primary, or consecutive upon the renal malady, and in either case more or less intimately connected with it. To this subject, however, more particular attention will be directed hereafter. Dropsical effusion most commonly exists either in the cellular tissue, or in the shut cavities, and much more rarely in the ventricles of the brain and in the spinal canal. The quantity of fluid effused is generally large. Sometimes the cellular tissue contains a gelatinous fluid instead of serum.

107. The above lesions, with the exception of those found in the *first* and *fifth* stages or forms of the disease, are nearly such as are described by M. RAYER. Besides these, however, there are various other alterations of the kidneys and urinary passages, which are occasionally seen in connection with them. Of these, the most important and intimately connected with the disease seem to be congestion or fibrinous concretions in the emulgent veins, and signs of inflammation or of its consequences in these veins: but these have not been observed either frequently or with requisite precision. The granular deposits and other changes described in the second and other forms of lesions above enumerated, are chiefly consequences of those described in the first form of the changes in the Malpighian bodies, and in the cortical structure generally, which, owing to the deposits of albuminous-like matter in them, present different appearances according to the amount of such deposits, and of the alterations of surrounding tissues occasioned by them. These alterations have frequently reached their furthest limits before death occurs, and before they come under observation.

108. I have already stated (§ 100.) that the granular deposits first noticed by Dr. BRIGHT in connection with dropsy, and described by him by the name of "*granular degeneration of the kidneys*," appear to originate in the glandular bodies of MALPIGHI. Since the time of this anatomist, and more particularly by FERREIN, BERTIN, SCHUMLANSKI, EYSENHARDT, and MAPPES, the Malpighian glandules or bodies have been viewed as the structure more immediately concerned in the secretion of urine. As such they have been described by MECKEL, CLOQUET, and others, who observe, that these bodies, glandules, or granulations, appear to consist of rounded corpuscles, visible to the unaided eye, in the form of very small points, which are connected with the minute and ultimate ramifications of the bloodvessels. Under the microscope, these bodies appear not only to consist of a reticulum of these vessels, but also to give origin to minute, white, tortuous canals, the conduits of FERREIN, which canals form a considerable portion of the cortical structure, and convey the urine from the corpuscles to the tubuli. MECKEL denominates these canals "the excretory canals of the Malpighian corpuscles." (T. iii. p. 557.)

109. From what has been stated above (§ 100.) I infer, that inflammation of the Malpighian corpuscles takes place in cachectic nephritis; that an albuminous deposit forms in them, giving rise to a granular appearance; and that, as the changes of these bodies and of the cortical structure advance, the other tissues are thereby altered more or less, until at last the tissues compressed by them become condensed or atrophied, and the substance of the organ further altered in consequence. These changes in the kidneys, which are nearly the same in both, especially the earliest changes, as the inflammatory state of the Malpighian corpuscles, and the commencement of granular deposits in them, are excited by previous changes in the blood, as contended for hereafter (§ 141. *et seq.*); and the associated maladies arise chiefly from the same cause, and from further alterations in it, owing to the morbid state of this very important emunctory.

110. ii. DIAGNOSIS.—*A.* The *acute form* of cachectic or albuminous nephritis is readily recognised by the co-existence of an albuminous, and often a sanguinolent, state of the urine, with the rapid development of anasarca, and occasionally of serous effusion into some internal cavity. In a few cases no dropsy takes place; but then the state of the urine, in connection with febrile irritation and derangement of the general health, will sufficiently indicate the nature of the disease. It may, however, be mistaken for simple *hæmaturia:* but in this latter, pure blood passes mixed with the urine; and fibrinous concretions or filaments, or even small clots of blood, are voided; whilst these circumstances do not occur in cachectic nephritis. In hæmaturia, moreover, one or both regions of the kidneys are more pained, and more tender on pressure, than in this disease. The urine also is rarely passed without pain, or having the same appearance at different hours of the day — circumstances rarely existing in this form of nephritis. In simple nephritis, and in some cases of the eruptive fevers, the urine contains albumen in a slight degree and for a brief period, but there is generally also a due proportion of urea, and the urates, and other saline matters, and hence the urine is not specifically lighter.

111. *B. The Diagnosis of Chronic Cachectic Nephritis* is more uncertain than that of the acute. When in a patient who experiences only trifling, if indeed any, pain in the loins, the urine is found of a low specific gravity, and contains albumen with only a small proportion of urea and the urates, the existence of chronic cachectic or albuminous nephritis is almost certain, especially if he be free from disease of the heart. And even when there is disease of the heart, the chances of mistake are small; for, if the congestion of the kidneys consequent upon disease of the heart give rise to the presence of albumen or of blood-glo-

bules in the urine, the quantity is small, and only occasionally observed; and the specific gravity of the urine, and the proportion of urea and urates, are not materially affected. The dropsical effusion also caused by disease of the heart usually commences in the lower extremities and extends upwards, whereas that arising from disease of the kidneys is often first perceived in the face.

112. M. RAYER remarks, that when, after a few days' indisposition, a patient is affected with serious cerebral symptoms, or with repeated attacks of vomiting, without dropsy, and when, at the same time, the urine is strongly charged with albumen and is of a low specific gravity, and if we cannot detect any disease of the heart, or of the bladder or urethra, the existence of chronic albuminous nephritis may be regarded as more probable than that of a primary cerebral affection. And if it be ascertained that the patient has been exposed to wet and cold, or addicted to the abuse of spirituous liquors, or affected with dropsy some months before, the presence of renal disease may be asserted with still greater confidence. The milky or whey-like appearance of the serum of the blood is no proof of the existence of the disease under consideration, for it has been seen very frequently by HEWSON, TRAIL, BABINGTON, myself, and others in various other diseases besides this; and urea has been found in the blood after simple nephritis and in atrophy of the kidneys, when the urine was not albuminous.

113. iii. COMPLICATIONS AND RELATIONS OF CACHECTIC NEPHRITIS TO OTHER STATES OF DISEASE. —I have already stated that cachectic nephritis rarely occurs without some previous disorder or even actual disease, and that such disorder is generally characterised by impaired organic nervous energy, by imperfect assimilation, and by the consequently morbid state of the blood. I have moreover contended (§ 141. *et seq.*), that the inflammatory condition of the kidneys in the acute form, and the lesions of these organs in the chronic, are consequences of these antecedent morbid conditions; and that several of the affections which I now proceed to notice, in relation to cachectic nephritis, often exist in a slight degree, either previously to, or coëtaneously with, the development of this malady; whilst others, or even the same affections in different cases, do not appear, or at least are not manifested, until consecutively upon the renal disease. From this it will be evident that I view cachectic nephritis as a consecutive or secondary malady, and that the various affections with which it is more or less intimately connected are either pre-existent to it, or co-existent with it, or consequent upon it,—that they are all, in many instances, progressive manifestations of successive changes in the economy, affecting more especially the circulating, or the assimilating, or the excreting organs, according to their several predispositions to disorder, or to inflammatory action, or to structural change, or to the influence of incidental causes and external agents; whilst in other cases, certain of them may occur as coincident effects of pathological causes—of pre-existing disorder, especially of that already specified. It should be recollected that the associated affections or complications are rarely single,—that disease of several viscera, besides the dropsical effusion, generally appears in connection with the renal malady even in the same case; but this will be seen more fully in the sequel.

114. *A. Relations of Cachectic Nephritis to Disorders of the Digestive Organs.*—*a.* The *mouth* and *pharynx* are rarely affected in connection with this disease unless consecutively upon it, when aphthæ, and even ulceration of the pharynx, may occur at an advanced stage. It has been observed that mercurials more readily affect the mouth and salivary apparatus in the course of chronic cachectic nephritis than in most diseases.—*b.* The *stomach* is more or less disordered either previous to, or at an early stage of, this malady. At this early period the disorder of the stomach consists chiefly of the more severe symptoms of dyspepsia; but nausea and vomiting are frequently complained of, and generally occur early in the morning or when fasting, especially in persons addicted to intemperance. In these cases, stimulants and food relieve the symptoms, and often comparatively little loss of appetite is felt during the day. In the acute states of the renal disease, the disorder of the stomach is more or less severe; whilst in the chronic form this disorder varies,—is sometimes slight, at other times severe, or consists chiefly of a sense of load or weight at the stomach, with eructations, acidity, and other symptoms of indigestion. These disorders are generally functional; but structural changes of the stomach are sometimes coincident with the advanced progress of the renal disease, especially inflammatory states and softening of the villous coat,—ulceration, with or without perforation, of the coats of the organ,—and fungous or encephaloid tumours. In these cases, particularly where ulceration or perforation has occurred, thickening or induration of the margins of the ulcerated part, and adhesions of the adjoining viscera, may have taken place.

115. *c.* The *intestines* are more or less affected in many cases of this malady; and most frequently in the form of *diarrhœa.* Both Dr. CHRISTISON and M. RAYER have noticed the frequency of this complication; it having occurred in more than one half of their cases; but Dr. BRIGHT and Dr. PROUT have observed it less frequently. It is observed chiefly in the chronic disease, and is sometimes preceded or attended by colicky pains in the abdomen, and occasionally by vomiting; but, in this latter case, there is often also pericarditis complicating the malady. The diarrhœa is generally consequent upon the renal disease, and it sometimes assumes a dysenteric character; the stools containing blood, and more rarely a flocculent whitish matter. However abundant or watery the discharges, they have no influence in diminishing the attendant dropsy, which may even increase during the diarrhœa. After death, the intestines do not always present lesions co-ordinate with the amount of disorder during life. In many cases, little or no redness of the mucous surface is observed. In others, redness of this surface, with enlargement of the follicles, with or without ulcerations, and often with anæmia of other parts, is remarked. Frequently, although the diarrhœa has been great and obstinate during life, the mucous membrane, and, indeed, the intestinal canal, have been anæmic throughout. Ulcerations are most common near the termination of the ileum and in the large intestines. In the former situa-

tion they are generally confluent; in the latter, disseminated and small.

116. *d. Peritonitis* in rare instances occurs consecutively upon cachectic nephritis. Cases of this complication are recorded by Dr. Bright, Dr. Gregory, Dr. Christison, M. Rayer, and others. In some instances the peritonitis is granular or tubercular; in others, it is attended by considerable effusion of a sero-puriform fluid. The peritonitis may be consequent upon enteritis, with or without ulceration (see article Intestines); or it may arise without the intestinal disease having been manifest. It is generally caused by the influence of cold and humidity during the existence of the renal dropsy, and is often not the only affection complicating this latter; both pleuritis and pericarditis, either singly or conjoined, being also present. In these cases, the symptoms of peritonitis are more or less manifest, generally with vomiting, diarrhœa, &c.; but as frequently they are by no means decisive.

117. *e. Lesions of the liver* are often found in connection with cachectic nephritis; but, in many cases, the lesion is slight. Dr. Bright found the liver quite sound in 40 cases out of 100; the change was slight in 35, and serious in 18 cases. M. Rayer states that this organ was more or less altered in about a third of the cases which he examined after death, in some throughout its whole extent, in others only in parts. It was enlarged in a small proportion of instances (one sixth), and chiefly in those cases where the heart was also diseased. Occasionally some portion of its peritoneal surface was adherent to adjoining parts. It was softer than natural in a few instances, but it was much oftener harder, or even indurated and diminished in bulk. In this latter case its surface was irregular, of a deeper colour than usual. When divided, its substance was found tuberculated, presenting the lesion which has been denominated *cirrhosis*, or the tubercular liver of drunkards. This particular lesion seems to be more frequently associated with granular kidney than any other alteration of the liver. In some cases the liver is enlarged, pale, and fat; a portion of its structure leaving an oily stain in paper. In a few instances, it contains large whitish tubercular masses. The bile is generally more or less changed from the healthy state. It is probable that the advanced stages of these lesions are consequences of the renal malady; but it is at least equally probable, that their early stages, or the functional disorders preceding them, exist antecedently to the development of this malady. The nephritic disease and the attendant dropsy are not infrequently further associated with affections of the lungs, or of the heart, or of the alimentary canal, or with chronic peritonitis. The complication with hepatic disease is often rendered manifest by the usual symptoms of chronic affections of the liver, and attended by vomiting, diarrhœa, and ascites.

118. *f.* The *Spleen* and *Pancreas* are sometimes diseased in cachectic nephritis. In all the cases in which the liver is affected, the spleen is also more or less altered, most frequently enlarged, and occasionally its substance is loaded with greyish granulations analogous to those found in the liver. (Rayer.) The structure of this organ is sometimes softened, occasionally firm or indurated. The *pancreas* has been found diseased only in a few instances, and in a slight degree. The disease has in a few instances appeared in the course of *pregnancy*, and M. Rayer details some cases thus associated.

119. As far as I have been able to observe the phenomena of the early stage of cachetic nephritis, and to learn the history of the patient's previous ailments, there has been more or less manifest disorder of the digestive organs, generally of a functional kind, but probably advancing to structural change in some cases, as the disease made progress. The influence of such disorder upon the state of the blood, and upon the processes of secretion and excretion, is sufficiently evident. In all these cases, and before dropsical effusion or vascular reaction had taken place, depression of the organic nervous energy, and consequent impairment of the functions of digestion, sanguifaction, and assimilation, were more or less remarkable. The vascular excitement, which sometimes appears at an early period of the disease, is the consequence, as I have already shown, of the morbid state of the blood; and of its influence upon the ganglial and vascular systems.

120. *B. Relations of Cachectic Nephritis to Diseases of the Respiratory Organs. — a.* Inflammation of the *throat*, extending to the *pharynx* and *larynx*, occurring in the course of scarlatina, sometimes is continued, with more or less severity, during the progress of the renal dropsy following this fever; and when the larynx becomes affected, the disease of this part may be so remarkably severe as to be speedily fatal. This form of complication, however, is not so frequent as inflammation and ulceration of the larynx, trachea, and even of the larger bronchi, which so frequently occur in the course of phthisis, the pulmonary malady giving rise not only to the affection of the respiratory passages, but also to renal disease and its consequent anasarca. In two cases, in which there existed a venereal taint, the progress of which I closely watched, and where it was difficult to decide whether the laryngeal or the pulmonary disease was the primary one, renal dropsy appeared at early periods of their progress, advanced remarkably far, and accelerated the fatal issue.

121. *b. Bronchitis* is one of the most frequent affections *consequent* upon renal disease. M. Rayer states that he has observed it in seven eighths of the chronic form of this malady. The bronchitis that occurs is rarely acute; it is almost always chronic; and, whilst the respiration is very slightly affected in some cases, it is much accelerated, and very difficult in others, particularly at an advanced period of this malady. The matter expectorated is chiefly mucus, occasionally thick and yellowish, in some instances glairy, and in others very abundant. The bronchitis generally aggravates the disease, and is sometimes the more immediate cause of death. It frequently occurs without any manifest cause; is rapidly propagated throughout the bronchi; is little influenced by treatment, or ameliorated by depletions; and often passes into oppletion of the minute ramifications and air-cells and extensive œdema of the lungs. Its more acute form is sometimes followed by lobular pneumonia. On dissection, the mucous membrane of the bronchi is found red throughout.

122. *c. Pneumonia* sometimes occurs as a *secondary* complication in the advanced stage of cachectic nephritis, and is more or less extensive and severe.

The inflammation attacks sometimes several lobes, sometimes only the whole or part of a lobe, and occasionally it affects many lobules of the lungs. In this latter case, the inflamed points are disseminated and isolated in the substance of the organ, some of them being in the state of red hepatization, others of grey hepatization, and closely resembling the lobular form of pneumonia, which occurs after morbid poisons, and sometimes after surgical operations. One or both lungs may be affected, more frequently both. The symptoms and signs of this pneumonia are usually masked by the general cachexia, by the dropsical effusion, by affections of the heart, and by other pulmonary lesions. Even the stethoscopic signs are ascertained with great difficulty, or altogether absent. The expectoration also is seldom characteristic of the disease, being more frequently catarrhal or bronchitic, than of the kind distinctive of pneumonia. Hence the inflammation is either latent, or not detected during life. In some cases, however, the sputa and the stethoscopic signs evince the existence of the disease. This complication is most dangerous, owing to the state of the constitution, and to the inefficacy or even injurious effects of bloodletting, and of many other means of treatment. It is often associated with pleuritis, or with bronchitis, or even with both, when it occurs consecutively upon renal disease.

123. *d. Pleuritis* is rare as a secondary disease in its simple form in connection with cachectic pleuritis, but associated with pneumonia, or with pulmonary tubercles, and with serous effusion in the pleuritic cavities, or with pericarditis, it is by no means unfrequent. It is generally latent or overlooked, or masked by dyspnœa or by bronchitis. It is sometimes chronic and occasionally acute and manifest. In some of the more chronic, masked, or latent cases, the disease assumes much of the character of hydrothorax, owing to the amount of fluid effused, and the slight grade of inflammatory action.

124. *e. Œdema of the Lungs*, with or without bronchitis or bronchorrhœa, is the next frequent secondary affection to bronchitis which occurs in the course of albuminous nephritis. Dr. Bright and M. Rayer found this lesion in about one third of the fatal cases. *Emphysema* of the lungs occasionally occurs, and *pulmonary apoplexy* more rarely, in the progress of the renal malady.

125. *f. Tubercular consumption* is very frequently connected with cachectic nephritis, but the connection is most commonly of a different kind from that usually observed in the other pulmonary affections with which this malady often becomes complicated in its course; the renal disease is almost always *consequent upon* the tubercular malady. M. Rayer believes that, in rare instances, the latter may be secondary of the former; but, although I have seen very many cases, since 1828, of renal dropsy supervening in the course of phthisis, I have never met with one in which this order was reversed. The renal malady may appear during any period of the tubercular disease, and in every form of it; in the most acute and febrile, and in the most chronic and apyretic. Generally the urine becomes more or less albuminous before any signs of anasarca appear. In a few cases the urine has been albuminous, and less dense than natural, in the advanced state of phthisis, and the kidneys have been found granular after death, and yet anasarca had not occurred. This may have arisen from the continuance of the colliquative perspirations, as these often cease upon the occurrence of the anasarca. Diarrhœa frequently continues during the renal disease, without diminishing the dropsical effusion. Bronchitis, pneumonia, pleuritis, laryngitis, pneumo-thorax, pleuritic effusion, or œdema of the lungs, or even two or more of these, may further complicate the tubercular malady and its consecutive renal disease.

126. *C. Relations of Cachectic Nephritis to Diseases of the Vascular System.* — *a. Diseases of the Heart* are often associated with cachectic nephritis, but the connection between them is not altogether evident. In some cases the cardiac, in others the renal, disease seems to be *primary*. The frequency of this complication also is not fully ascertained. M. Rayer states, that it occurred in one fifth only of his cases, whilst Dr. Bright found it in sixty-five cases out of a hundred. The cardiac affection may appear, in some instances, as the primary, in others as the consecutive, and in others as an accidental malady; and yet both it and the renal disease may only be the more or less remote effects of previous changes in the states of organic nervous power, and of the circulating fluids, either of which may precede the other in the order of succession or sensible manifestation, in different cases, or in different circumstances. This view of the subject, which is equally applicable to some other complications of this malady, has been unaccountably overlooked by those who, in most respects, have written well on the disease, and contributed greatly to its history and elucidation. The occurrence of this complication has great influence upon the production and increase of the dropsy generally consequent upon the renal malady, and usually causes the anasarca to commence in the lower extremities. Dr. Bright and Dr. Christison think that the cardiac disease is most frequently secondary, whilst M. Rayer believes that the kidneys are oftenest consecutively affected; and I consider that interrupted circulation through the heart and lungs favours remarkably the occurrence of the chronic states of this malady. That the urine is often albuminous in persons affected with disease of the heart, when there is no serious affection of the kidneys, cannot be denied; but if, along with this character, it is of a pale citrine colour, strongly coagulable, and of a low specific gravity, these are strong proofs of the presence of structural disease of the kidneys.

127. *b.* The *pericardium* often contains a small quantity of limpid serum, from four to five ounces, in fatal cases of cachectic nephritis; but rarely so much as to constitute true pericarditis. Lesions of the pericardium may be either antecedent to, or consequent upon those of the kidneys. The relative dates of these lesions may be often inferred from the history of the case, in connection with their appearances upon dissection. There can be no doubt that, when the heart or its valves are diseased, the pericardium becomes more liable to inflammation, or to be the seat of effusion; and that this liability, more especially to inflammatory action, is much increased by the renal disease and the morbid state of the blood. Hence old lesions of the pericardium, or recent changes in it, or even both, will occasionally be found after renal dropsy, although they may be detected with difficulty

during life, whether they be associated with other cardiac lesions or not. The remarks I offered above (§ 126), respecting the complication with cardiac disease, apply here: the pericardiac lesion may be either primary or secondary in appearance, and yet both it and the renal malady may be only the consecutive effects of anterior disorder, some exciting or concurring cause, as cold and humidity developing these two diseases as effects of this disorder, which may not have been manifested, especially in these organs, if such exciting or determining cause had not been in operation.

128. *c. Endocarditis* is also sometimes associated with cachectic nephritis, and is most probably consequent upon the morbid state of the blood, in the advanced stage of the latter malady. It may be present either simply or complicated with pericarditis or other lesions of the heart. M. Rayer thinks it not always possible to say which of the two affections is primary or secondary. He believes them, in a very few cases, to be almost coëtaneous; but, in a much greater number, he considers the endocarditis to have preceded the renal malady. I think that the order of morbid procession is different from this in most instances.

129. *d.* Various *lesions of the heart, of its valves,* and *of its orifices,* are found in connection with albuminous nephritis; and these morbid states may be further associated with alterations of the serous surfaces of the organ, or with disease in some other important viscus, as the lungs, the bronchi, &c. Amongst these, lesions, hypertrophy, dilatation, &c., of some one of the chambers, dilatation of the orifices, insufficiency of the valves of the heart, &c., are not uncommon; but it is unnecessary to specify the various combinations of disease which present themselves in this class of cases, as they vary much in different instances. These lesions favour the supervention of the renal malady by causing congestion of the kidneys.

130. *e.* The *blood-vessels* sometimes present alterations of structure in cachectic nephritis, consisting chiefly of atheromatous and ossific deposits, with or without dilatations, and varicose states of the veins; more rarely of aneurismal dilatations, and of the consequences of inflammation. Dr. Bright and M. Rayer have found evidence of pre-existent inflammation of the renal veins; and have remarked, that the arterial ramifications through the granular kidney were not so easily penetrated by an injection as those of a sound kidney.

131. iv. *Relations of Cachectic Nephritis to Cerebral Affections.* — Cerebral affections sometimes occur in the course of the renal malady, and chiefly in its far advanced stage, and in its more acute form. These affections consist of comatose, apoplectic, or convulsive seizures, and of more or less sudden death, with insensibility. In many of these cases there is little or no appreciable lesion of the brain; but more frequently there is effusion of serum within the ventricles and under the arachnoid. All these affections are consequences of the renal malady, or rather of that change of the blood which is connected with, and augmented by, the renal disease. In a few instances, *lethargy* or *coma* precedes death for a considerable period, from which the patient may be partially roused, but in which he immediately afterwards falls, the comatose state becoming gradually more profound, and passing into apoplexy, with stertorous breathing, or into convulsions, or into a mixed state of apoplexy and convulsions. The serum within the ventricles or under the arachnoid, in these cases, has been found by Dr. Barlow to contain urea. Extravasation of blood in various situations within the cranium, as in the substance of the brain, in the ventricles, or between the membranes, — or true apoplexy, in the course of cachectic nephritis, — has been observed by Dr. Bright, Dr. Christison, and M. Rayer, but this, probably, was only an accidental complication: it is of rare occurrence.

132. *D. Relations of Cachectic Nephritis to Diseases of the Skin and Cellular Tissue.* — *Chronic eruptions* on the skin, indolent and gangrenous *sores* and *ulcers* of the extremities, *erythema,* and *erysipelas,* are sometimes associated with the renal malady. When they appear during the distension occasioned by the dropsical effusion, both their occurrence and the unfavourable form they are apt to assume chiefly arise from this circumstance. But in earlier periods of the disease they proceed in a great measure from the existing cachectic state of the constitution and the change in the blood, disposing any injury or irritation of the skin to pass into inflammation, which, owing to these states, often assumes an asthenic or spreading character. This form of complication is not infrequently further complicated with disease of one or more of the abdominal and thoracic viscera.

133. *E. Relations of Cachectic Nephritis to Eruptive and other Fevers.*—The appearance of this disease, in connection with these fevers, has been almost confined to *scarlatina.* A case, however, has been published by Dr. Gregory, in which it was consequent upon measles in a scrofulous girl. The occurrence of dropsy, with scanty, bloody, or coagulable urine, subsequently to scarlatina, especially to the less severe forms of that disease, and in some epidemics more frequently than in others, has long engaged the attention of medical writers. Calvo, Borsieri, Störck, Plenciz, Rosenstein, Wells, Blackall, and Reil, have noticed the state of the urine, and the peculiar character of the dropsy, after scarlet fever, but have not connected the disease with inflammation or other lesion of the kidneys; and, until very recently, the dependence of this form of dropsy chiefly upon an inflammatory state of the kidneys was not ascertained or even suspected. Dr. Fischer, in a *Memoir on the Treatment of Scarlatina,* published in Hufeland's and Ozann's *Journal (Feb.* 1824, st. 53.), remarks that the kidneys are often severely affected in the latter stages of scarlatina, — that they are in a state of congestion, which is readily converted into inflammation by diuretics, and especially by those which are stimulating and acid. He adds, that he long considered the vomiting, which frequently attends the accession of dropsy consecutively upon scarlet fever, to be caused by disease of the brain; but further observation and careful dissections proved to him, that it was symptomatic of disease of the kidneys. He subsequently endeavoured to ascertain the symptoms which marked this affection of the kidneys at its commencement, and he found them in the urine, which became more scanty, of a deeper colour, sometimes tinged with blood, or even containing pure blood, when the vomiting appeared. Mr. Hamilton details a case in his account of an epidemic scarlatina, &c.

(*Ed. Med. and Surg. Journ.* vol. xxxix. p. 145.), in which the same appearances as are described under the first form of lesion (§ 100.) of the kidneys were found in a patient who died from this consecutive disease. Respecting this connection of renal dropsy with scarlatina, M. Rayer remarks—

134. 1st. That in certain cases of scarlet fever, particularly during the period of desquamation, the urine is more or less loaded with albumen, without dropsy occurring; at the same time the kidneys are congested with blood, or present lesions corresponding with those belonging to the first form, which is commonly produced by cold and humidity, or by the abuse of spirituous liquors. 2d. That the dropsy sometimes observed after scarlatina, in its course, and as respects its exciting or determining cause (cold and humidity); in its general characters, and the alteration of the urine attending it; in its abdominal, thoracic, and cerebral complications; in the structural lesions observed after it; and as to its nature and treatment,—differs in no respect from the acute and chronic albuminous nephritis produced by other causes, and appearing under other circumstances. These inferences are fully supported by my own experience, and by the evidence recorded by Bright, Wood, Stark, Alison, Graves, Seymour, Guersent, Rayer, and others.

135. When cachectic nephritis takes place after scarlatina, it commences about the close of the third, or beginning of the fourth, week from the appearance of the eruption. The patient, although he may have been previously recovered, becomes uneasy and somewhat feverish. His sleep is disturbed, his appetite is impaired, and sometimes nausea and vomiting are present. A few days afterwards a puffiness is noticed about the eyelids, gradually extending to the face and neck, and thence to the extremities and trunk. The countenance at the same time becomes pale and cachectic. Sometimes the œdema appears suddenly, and almost simultaneously, over the whole surface of the body. The urine is commonly much diminished in quantity, and voided frequently and with difficulty. It is of a deep reddish brown, and often contains a portion of blood mixed with it. Generally a flocculent whitish matter may be seen suspended in it, resembling unclarified whey, or, when there is any admixture of blood in the urine, like the water in which raw meat has been washed. Its specific gravity is more or less below the healthy standard. The action of the heart is frequently strong or tumultuous: the skin is hot, and the breathing is quickened and oppressed. In some cases the head, in others the chest, and in others the abdomen, is the chief seat of suffering. Such usually is the *acute form* of the disease as occurring consecutively upon scarlatina; but it has occasionally appeared more suddenly, particularly when the patient has been exposed, at or soon after the period of desquamation, to cold and humidity, and it has then, in a few cases, terminated fatally in forty-eight hours after its appearance, from the supervention of coma, or convulsions, or asphyxia. In the *chronic state* consequent upon scarlatina, there is commonly little or no fever, and the action of the heart is much less exerted. The symptoms are less severe and more gradual in their appearance and progress. The urine is less deeply coloured, but always albuminous, and of lower density than natural.

136. In the *acute form* of the disease consequent upon scarlatina, vomiting, dilatation of the pupils, slowness and irregularity of the pulse, stupor, coma, paralysis, convulsions, &c., sometimes appear and indicate a most dangerous affection of the brain, often with serous effusion within the ventricles, or under the arachnoid. Pulmonary complications are very common in the acute cachectic nephritis following scarlatina. These are either inflammation of the bronchi, or of the lungs, or of the pleura; or serous effusion in the cavities of the pleura or in the pericardium, or œdema of the lungs; these effusions being consequent upon an inflammatory or congested state of these parts, the vessels, owing to the cachectic condition of the constitution, and to the states of vital power and of the blood, being incapable of throwing out coagulable lymph, but allowing a liberal discharge of serum. These inflammatory complications were frequently observed in the epidemic scarlatina which occurred in Florence in 1717; and Borsieri remarks, that the Florentine physicians, "Mortuorum cadavera secuerint, inveneruntque pulmones, pleuram, intercostales musculos, diaphragma, *renes*, et intestina plus minusque inflammatione correpta." Cachectic inflammation of the kidneys may occur after scarlatina, the urine being albuminous, and yet no anasarca may take place. Generally in these cases there is either a very scanty secretion or an entire suppression of urine, and the patient is more or less suddenly carried off by internal congestion, or inflammation, or serous effusion; stupor, coma, paralysis, convulsions, or asphyxia, ushering in dissolution. The occurrence of this form of nephritis after other *fevers*, as typhoid, remittent, and intermittent fevers, has not hitherto been observed.

137. *F. Relations of Cachectic Nephritis to Scrofula.* — Most of the instances of this disease that I have observed have been in children and adults of the scrofulous diathesis; and the experience of Bright, Gregory, Christison, Hamilton, and Rayer is to the same effect. Strumous children who are insufficiently clothed and fed, and exposed to cold and humidity, are liable to be affected with this malady; and some of them possessed of this constitution become the subjects of this form of nephritis without being exposed to these exciting causes; and indeed all the patients who are attacked with it, independently of these causes or of intemperance, more especially those who are young, present more or less decided evidence of a scrofulous taint, which acts, as shown hereafter (§§ 148. 152.), both as a predisposing and as an exciting cause. In many of these cases, evidence of anterior scrofulous disease is manifest, whilst in others scrofulous abscesses or diseases of the bones coexist with chronic cachectic nephritis.

138. *G. The connection of this malady with the syphilitic taint* has been pointed out by M. Rayer; and it may be doubted whether or no this connection is owing to a syphilitic cachexia or to the means which had been employed to cure it, as a liberal or excessive use of mercury. Wells and Blackall ascribed the appearance of dropsy with coagulable urine, in such cases, to this particular cause. In two cases, both professional but not medical men, this form of nephritis occurred during

an advanced stage of their maladies. They both had had severe secondary syphilitic symptoms, for which mercury had been employed, and soon afterwards tubercular consumption manifested itself. During the treatment of this latter, the usual signs of cachectic nephritis appeared, and hastened death much sooner than it probably might otherwise have taken place. A similar instance is recorded by M. RAYER.

139. *H. The connection of cachectic nephritis with rheumatism* has been insisted upon by Dr. CHRISTISON, who remarks that, in every instance of obstinate chronic rheumatism that comes under his care, he examines the state of the urine as to its coagulability and density. The rheumatic affection which is sometimes thus connected, is commonly of the neuralgic kind, and precedes, rather than attends, the dropsical affection. This complication occurs chiefly in those who have been habitually exposed to cold and humidity. The connection of this form of nephritis with *gout* is comparatively rare.

140. iv. NATURE OF CACHECTIC OR ALBUMINOUS NEPHRITIS. — From what I have already stated with reference to the *causes*, and the *associations* or complications of this malady, views as to its nature, and more especially the one entertained by the author, may be readily understood. Hitherto, it has not been sufficiently considered as a merely secondary disease, all the phenomena in any way connected with it being considered rather as signs and symptoms of its pre-existence, in some one or other of the forms of lesion described above (§ 100 *et seq.*), than as concomitant changes, many of which depend more upon antecedent disorder than upon the associated or otherwise related affection of the kidneys. The questions, therefore, are — 1st. In what does this primary disorder consist? 2d. In what manner does the renal malady arise consecutively upon it? and 3d. Wherefore is this consecutive disease so very generally associated with others, in some part of its course? What has already been advanced will render it unnecessary to enter upon lengthened details in answering these questions.

141. 1st. The several circumstances connected with the origin of the malady — the predisposing and the concurring and exciting causes — the existence and the character of antecedent disorder affecting either the general constitution or the functions of some vital organ, — all combine in evincing that the earlier morbid states are impaired organic nervous power, and, consequently, insufficient sanguification and assimilation, with disordered secreting and excreting functions. It will necessarily follow, even from an early stage or from a slight grade of these morbid conditions, that the blood will be more or less affected, and that a change in the blood will, according to the nature of such change, affect also other organs.

142. 2d. It is difficult to state with any degree of precision what are the changes which impaired organic nervous power, and consequently weak digestive and assimilative functions, will produce in the blood at early stages of their existence; but, in more prolonged periods of their influence, the results are frequently remarkable to the senses, although not so precisely determined by chemical or physical analysis. It is probable, from the results of observation and of analysis as partially employed, and from analogy, that the chyle is not fully elaborated in the first instance, and subsequently changed into healthy blood; that the serum contains more oily or fatty matter than natural, the result of insufficient assimilation; and that the several constituents of the blood, in relation to each other and to the system in which they circulate, are held together by a weaker vital affinity. During this state of the organic nervous power and of the circulating fluids, the excretory functions necessarily become impaired; and although those substances which are the ultimate results of assimilation may not be abundantly produced, certain of them, as urea, may be present in excess in the blood, owing to insufficient excretion, especially by the skin and kidneys. The resulting morbid condition of the blood will thus become an exciting cause of vascular disease of the kidneys progressively advancing to organic change; and, once these important eliminating organs are diseased, the blood will become more and more altered, and sanguification the more impeded or altogether arrested. In all cases, also, both kidneys will be affected, for as in other diseases, where the causes are constitutional, consisting of cachectic states, or of changes in the blood, double organs, or similarly constituted tissues, will experience similar or even identical changes.

143. 3d. The chief reasons for the appearance of cachectic nephritis in connection with other maladies are apparent in the very condition or circumstances of the constitution, and of the health, of persons in which it occurs. There is not only the pre-existing impairment of the digestive and assimilating powers just insisted upon, but there are also, in many cases, other antecedent maladies, which are always attended by weakness of these functions, as phthisis, scrofula, scarlet fever, &c., and which readily give rise, especially in certain states of predisposition, to the renal malady as a secondary or more remote effect. In these cases, the associated or related disease is primary, and favours the production of that state of the blood which affects the circulation, and ultimately the structure of the kidneys. Other complications are either associated results of the previous disorder, — are equally with the renal malady effects of the previous changes in the states of organic nervous energy, and of the blood, — or they are consequences of the disease of the kidneys, through the medium of the blood, a morbid state of this fluid being much increased by the affection of these organs; and being such as readily inflames or irritates parts which, from predisposition, former disease, or the influence of concurring causes, or prevailing influences, become more liable to those consecutive affections.

144. The *dropsy* so generally attending this malady arises from more than one of the pathological states constituting it. In the *acute* or early state of the disease, and especially when it is consequent upon scarlatina, the anasarca is chiefly owing to the weakened vital affinity subsisting between the constituents of the blood, and to the weakened tone of the extreme capillaries. Probably something is also owing to the suppressed functions of the skin: exhalation from the external surface of the integuments being interrupted, it becomes increased into the areolar tissue. The action of the kidneys is also impaired in most of the acute states of the disease; the watery parts of the blood become excessive; ex-

crementitial plethora is thus produced; and effusion takes place from the overloaded vessels. In the *chronic* and far advanced states of the disease, the dropsy is owing chiefly to the change in the blood itself — to its thin and impoverished condition, and to impairment of the vital affinity between its several constituents, and between it and the blood-vessels. That the dropsy is not owing to excess of serum, is shown by its coexistence with a free discharge of urine, and with diarrhœa, and with an anæmic state of the vascular system, in many instances. It may, however, be increased by the suppressed perspiratory functions of the skin.

145. v. Prognosis.—The very serious and dangerous nature of this disease may be inferred from what has already been stated respecting it. — *A.* In the *acute state*, death sometimes takes place suddenly, owing to the rapid development of disease in the brain, lungs, or pericardium. Hence the propriety of attending to the states of these organs as long as the urine continues to be albuminous or sanguinolent. This form of the disease is less dangerous when it occurs after scarlatina, or during the early stage of pregnancy, than in other circumstances. The nature of the chief *causes* should always be considered before a prognosis be given in any case: for when the malady proceeds chiefly from intemperance, the chance of associated visceral disease, although it may not be very manifest, and the danger, are always increased. The prolonged influence of cold humidity, and of low or damp residences, generally occasions a more dangerous malady than the temporary operation of these causes.

146. *B.* In the *chronic form*, the prognosis is still more unfavourable than in the acute,—a fatal issue may be more remote, but it is more certain ultimately. As long as the urine is coagulable, and of diminished density, the patient is in a most precarious state, from the tendency in these circumstances to dropsy, pleuritis, pericarditis, cerebral affections, and to various other maladies, which assume the most dangerous forms when associated with renal disease. Any marked diminution of the quantity of urine, when it is of morbid composition, should always be viewed with great suspicion, as often preceding the maladies now mentioned. A still more remarkable diminution of the quantity of urine, or its entire suppression, is generally a precursor of a cerebral attack and of a fatal issue. The more manifest also the cachectic state of the constitution, and the more important the affection complicating the renal malady, the more unfavourable does the prognosis necessarily become, and still more so when these two circumstances are conjoined in the same case.

147. An increase of the quantity of urine, relatively to the amount of fluid taken, coincidently with a diminution of the dropsy and of the albumen in the urine, is generally a favourable omen; but unfortunately it is not rare to see this change arrested suddenly in the course of a few days, and followed by an increase of all the symptoms. A return of the specific gravity of the urine to the natural state, owing to an increase of the urea and salts naturally existing in it, coincidently with a marked diminution of the albumen, is a very favourable circumstance; but it is very rarely observed in the chronic form of the disease. The diminished density, on the other hand, of the urine is an unfavourable circumstance, more particularly if the quantity voided be not augmented. Upon the whole the prognosis in this form of the disease should depend upon the number and nature of the primary concomitant or consecutive affections complicating it, rather than upon its duration and history. Of these affections some are acute, as cerebral attacks, pneumonia, pericarditis, &c., and speedily fatal; others are chronic, as scrofula, tubercular consumption, organic lesions of the stomach, or of the liver, or of the heart, the syphilitic cachexia, &c., and place the patient in equal, although not in so immediate, danger.

148. vi. Remote Causes. — *A.* The *predisposing causes* of cachectic nephritis are whatever depresses vital power, and tends to render the system cachectic. The scrofulous diathesis and a syphilitic taint, the former especially, favour the operation of the more direct or exciting causes. This disease rarely attacks infants, or very aged persons; but it is frequent in children, in the acute form, chiefly as a sequela of scarlatina, and occasionally in the chronic form in children of the scrofulous diathesis, both primarily and consecutively upon scarlatina, and upon febrile or other disorders. It is most prevalent in cold and humid countries, and in places where spirituous liquors are most indulged in. It occurs more frequently in males than in females, probably in consequence of the former being more exposed to its exciting causes; and it is most prevalent between the ages of 20 and 50. My own observation fully confirms the following statement of Dr. Christison. In the greater proportion of cases, he observes, — in almost all those of a chronic nature, as well as in a few of the acute, the disease appears to be formed gradually, without any obvious exciting cause, under the influence of some depraved state of the constitution. And even in many of the acute cases, arising apparently in decided exposure to cold, the malady has silently originated in some constitutional cause at an earlier period, recent exposure having merely superadded some acute secondary affection, or given an acute character to pre-existing essential symptoms. It is clear, too, from the character of the disease in the generality of instances, as well as from the very peculiar nature of the morbid deposition in all, that there must always co-exist some constitutional infirmity, or otherwise some essential predisposing cause. This circumstance, however, does not exclude from the disease the constitutions of the robust and athletic. Dr. Christison has several times witnessed it in persons of robust habit and powerful frame: and M. Solon makes the same remark as to his experience. But a robust frame is not incompatible with infirmity of constitution in respect of morbid predisposition, as is familiarly exemplified by phthisis.

149. In this country, that state of constitution which results from habits of intemperance is the most influential in predisposing to the disease. Dr. Christison remarks, that from three fourths to four fifths of the cases he has met with in Edinburgh have been in persons who were habitual drunkards; or who, without deserving this appellation, are in the constant practice of using ardent spirits several times in the course of

the day, and of occasionally indulging to intoxication. In these persons, this habit is both a predisposing and an exciting cause — no other remote cause concurring to develope the morbid conditions constituting the disease. In most of the cases that thus originate, we find both tubercular liver and granulated kidneys, and the resemblance between both kinds of lesion is very close. In many, however, of the cases which appear thus to originate, it will be found upon a strict examination — upon inquiring into their previous states of health, their hereditary predispositions, their apparent diathesis, and the evidences of either external or internal pre-existent affections — that they present more or less conclusive proofs of the scrofulous constitution; habits of intemperance, and various other concurring or exciting causes, chiefly aiding this condition in originating the disease. The frequency of its occurrence in persons who have had enlarged or inflamed glands, or have presented other evidence of scrofulous or tubercular affections in early life, and in persons labouring under tubercular consumption, is an additional proof of the truth of this inference. Amongst this class of causes, intemperance in sexual indulgence and manustupration may be added.

150. Previous disease of the digestive, assimilating, and circulating organs of the stomach, liver, lungs, and heart, — tubercular formations, and continued and eruptive fevers, more especially *scarlatina*, — favour more or less the occurrence of this malady. In many instances, scarlet fever both predisposes to, and more directly occasions, it; no other causes but this being apparentley concerned in producing it.

151. *B. Exciting causes.* — *a.* Exposure to cold and humidity, or to either singly, and whatever has the effect of suddenly checking perspiration, as drinking cold fluids when the skin is perspiring, are the most frequent causes of the *acute* state of the disease; which most frequently occurs in persons who are most exposed, by occupation, to those causes and to vicissitudes of temperature, or who live in cold and damp cellars or localities. These causes also often co-operate with others, not only in originating the malady, but also in producing relapses or exacerbations. They frequently, even in their slighter grades, are more or less influential in developing the disease after scarlatina, especially during or soon after the period of desquamation.

152. *b.* The *chronic* form of the disease is generally occasioned either by intemperance, or by the prolonged influence of cold, humidity, and low damp residences, or by both classes of causes. M. RAYER considers cold and damp the most frequent cause of the disease in France. Poor, innutritious, or unwholesome food, physical misery and destitution, are also influential in producing it. The inordinate or liberal use of mercury was considered by Dr. WELLS and Dr. BLACKALL to be occasionally productive of albuminous urine; but Dr. RAYER has met with no proof of this effect of mercury. He states that pregnancy seems to give rise to an albuminous state of the urine. I have seen two instances of this change in the urine in pregnant females, but had no opportunity of ascertaining the results in these cases. The *pre-existing diseases* which seem to be most influential in exciting, as well as in predisposing to, cachectic nephritis, are scrofula, scarlatina, disorder of the functions of digestion and assimilation, diseases of the lungs, of the heart, and of the liver, and the syphilitic taint. It appears in the advanced course of tubercular consumption in a very large proportion of cases, and is always the consecutive affection, as remarked by M. SOLON and Dr. CHRISTISON; but this connection of the disease is more fully insisted upon above (§ 125.).

153. vii. TREATMENT.—The treatment of this disease should depend much upon the *form* it assumes, upon its *stage* or *duration*, upon the *causes* which have induced it, and upon the *complications* it presents. — *A.* In the *acute form* and early *stage* of the disease, the treatment should be decidedly antiphlogistic; but yet with strict reference to the predisposing and exciting causes. — *a. Blood-letting*, general or local, is always necessary, especially at the commencement of the disease; and it should be carried to an amount which the circumstances of the patient, and the degree of febrile action, will suggest. In the majority of cases, *cupping* on the loins is the most appropriate method of vascular depletion; but, in the most acute states, and in more robust persons, a general blood-letting should be premised: and, in these, cupping on the loins may be even repeated in some instances. In children, after scarlatina, cupping should be the chief or only mode of depletion.

154. When the anasarca is great, *venæsection* should be practised with caution, as respects this operation itself; for, although there is a necessity for blood-letting, there is a great tendency to inflammation of the vein, if the incision be imperfectly closed, or exposed to the air. It is chiefly in the febrile, acute, and early stage of the disease, that vascular depletion can be employed with advantage, and especially when the disease is caused by exposure to cold and humidity. When *acute* or *subacute* symptoms appear in the course of the chronic form of the malady, even local depletions should be practised with caution; the previous and present states of the disease, the complications, and the constitutional and vascular conditions, being the only guides by which the practice ought to be directed. In most cases, cupping is a preferable mode of depletion to the application of leeches, inasmuch as the quantity and state of the blood drawn are more accurately ascertained by the former, and erysipelas is less likely to follow it, than the latter.

155. *b.* In the acute and early stage of the malady the warm or vapour *bath* may be employed, and be aided by warm bed-clothes, so as to promote the cutaneous transpiration. *Diaphoretics* may also be prescribed; and their operation may be assisted by warm diluents, demulcents, &c., containing small quantities of nitre, or the spirits of nitric ether. If the patient leave his bed, especially if the season be cold, the clothing should be warm, and he ought to wear flannel from head to foot, and avoid currents of cold air and stimulant beverages.

156. *c. Purgatives* are always requisite, and the more so when the dropsical effusion is great. They ought to be exhibited at the commencement of the treatment, and instantly after the first blood-letting. The selection of purgatives should be guided by the complications, by the form and

amount of the dropsy, and by the state of the urine. The compound jalap powder, elaterium, gamboge, the more common purgative pills (see *Appendix*), the saline aperients, &c., may be prescribed according to circumstances, and to the states of the stomach and bowels. When *vomiting*, or much irritability of stomach, is present, blood-letting, as just advised, will often allay this symptom, and prepare for the exhibition of purgatives, which may be conjoined with colchicum; but if this symptom continue, creasote or the hydrocyanic acid will generally allay it. Dr. PROUT remarks that, when the more active symptoms have subsided, the purgatives may be associated with diuretics: or the diuretics may be given alone, as the case may indicate. Of diuretics, the nitrate, tartrate, or super-tartrate of potash, conjoined with nitre and the spiritus ætheris nitrici, are amongst the best, and may constitute a part, at least, of the prescription. Blisters are doubtful remedies; though, if not kept applied too long, they may be sometimes useful. But strong mustard poultices, or other irritants, producing speedy and decided effects, are preferable. When *diarrhœa* accompanies this state or stage of the disease, warm baths, small doses of opium, or of DOVER's powder, and leeches applied to the perinæum or anus, are the most beneficial remedies.

157. When the urine has assumed its usual quantity and properties, we may conclude that the acute state has subsided; though the urine will be found to contain more or less serum for a considerable time subsequent to the attack, particularly after meals. In the latter stages, purgatives must be given with caution; but diuretics are occasionally required to the last; and warm baths are often of service, particularly when they are used by the bed-side of the patient, and shortly before the hour of repose. If, after a week or two, the quantity of albumen in the urine again become increased, and if other signs of a *recrudescence* of the renal disease be present, cupping on the loins should be repeated, and this may be followed by the application of external irritants, and these by emollient cataplasms in the same situation. During the acute stage of the disease, the *diet* and *regimen* should be antiphlogistic. M RAYER states that he has found a milk diet, continued for some days after the subsidence of the acute symptoms, of great service.

158. *B. Treatment of the Chronic Form.*—Whilst the treatment of the acute disease is simple, that of the chronic is difficult and complex; and whilst it is often efficacious in the former, it is generally ineffectual in the latter. In the majority of cases, all that we can hope to effect is to arrest or suspend the morbid action; a complete cure is hardly within our reach. The treatment, nevertheless, should embrace the various considerations suggested by the states of the urine and kidneys, by the attendant dropsy, by the constitution of the patient, and by the antecedent disorder and present complications.

159. *a.* Whenever there is reason to suspect the existence of active congestion of the kidneys, either from a feverish state of the system or from local uneasiness, cupping on the loins may be resorted to; but we should be careful not to employ too large depletions, more especially when the renal malady has been prolonged and is far advanced, or structural lesion very serious. Great mischief will be done by lowering the powers of life in these circumstances, and the local change will be increased rather than diminished by the depletion. Unless at a very early stage of the chronic malady, the morbid state of the blood, and even its deficiency, forbid the abstraction of it unless in small or moderate quantity, when the supervention of acute or sub-acute symptoms, or of inflammatory attacks of other organs, as of the pleura or lungs, demands a recourse to this measure; for the occurrence of these attacks during the course of the renal disease is the consequence of the attendant state of the blood chiefly, and not of the lesion of the kidneys *per se*—a state of the blood which generally contra-indicates vascular depletion, although the nature of the complication may *seem* to require it. The circumstances which more especially should suggest great caution in prescribing even local depletion, are, debility and a manifest cachectic appearance consequent upon previous ill-health, or a chronic continuance of the renal disease. The co-existence of chronic incurable maladies, as tubercular phthisis, lesions of the heart and valves, particularly insufficiency of the valves, organic changes in the stomach, altogether contra-indicates a recourse to general or local blood-letting.

160. *b.* In the chronic as well as in the acute form of the malady, warm or vapour baths, flannel clothing next the skin, and the avoidance of cold, humidity, spirituous liquors and other exciting causes, are requisite. M. RAYER states that he has found setons, issues, and other exutories in the loins very advantageous; and that from four to twelve drops of the tincture of cantharides, given for a dose in some emulsion, have also been of service. I have given equal quantities of this tincture with the tincture of the sesqui-chloride of iron, with marked benefit, in a few instances. Iodurretted and mercurial ointments have been prescribed to the loins without any service; and the balsams have been taken internally with little or no advantage.

161. *c.* In the more advanced states of the disease, the preparations of *iron*, judiciously chosen, and combined with other medicines, are often more or less beneficial. I have seen more advantage derived from them than from any other class of medicines. The circumstances of particular cases can alone suggest those preparations which should be selected. When the dropsical effusion indicates a recourse to hydrogogue cathartics or to diuretics, some preparation of iron should be added, particularly when debility or cachexia is very manifest.

162. *d.* Of all *diuretics*, M. RAYER prefers a decoction of the *wild horse-radish*. It may be made a vehicle for other medicines. He agrees, however, with Dr. BRIGHT in having little confidence in the most of diuretic remedies, and thinks that Dr. CHRISTISON has over-rated their value. In this disease, many substances disorder the stomach, thereby further impair digestion and assimilation, and accelerate its unfavourable progress. Many diaphoretics, particularly when given in full doses, have this effect, as DOVER's and JAMES's powders. The decoction or tincture of *guaiacum* is the best of this class of medicines, especially when the skin is cool as well as dry. Diaphoretics, diuretics, and purgatives or aperients, when clearly indicated, should be selected and conjoined with strict reference to the states of the digestive organs, of the

vital powers, and of the circulating fluids, as shown in preceding sections. It is chiefly owing to a neglect of such reference that an injudicious recourse to punctures of the skin has been had in this disease, in order to allow the escape of effused fluid. The states of the system just alluded to favour the occurrence of inflammation and consequent gangrene of the punctured parts. Dr. PROUT advises a recourse to a seton or issue in the region of the kidneys, and to the infusion of *diosma* with sarsaparilla. As a diaphoretic he prefers the citrate of ammonia, and as the disease proceeds the *pareira brava* or the *uva ursi*, combined with other medicines, according to the circumstances of the case.

163. *C. The Treatment of the Complications* of cachectic nephritis is always difficult and often hopeless. When they assume an acute form, they must be promptly met, and subdued or arrested within twenty-four hours from their appearance. If they are of a chronic kind, we can expect only to palliate the more urgent symptoms. — *Of the diseases which are associated with the renal malady*, it will be necessary to notice the treatment only of a few; for the means which are appropriate to the rest are either so manifest, or depend so entirely upon the circumstances of individual cases, that the physician will readily perceive them, and apply them accordingly.

164. *a. In Relation to Diseases of the Digestive Organs* (§ 114.), the treatment of cachectic nephritis requires the utmost attention to *diet* and *regimen*. The food should consist of articles which are the most readily assimilated, especially of the lighter kinds of animal food, and of milk boiled with farinaceous substances. The bitter tonics, sarsaparilla with liquor potassæ, or lime-water, or with BRANDISH's alkaline solution, and other restoratives, are especially necessary when the dyspeptic affection is attended by acidity and flatulence. In these as well as in other circumstances, the preparations of *iron*, but especially the *Mist. Ferri Composita*, are also beneficial, and should be taken for a considerable time. When irritability of stomach or *vomiting* is present, *creasote*, with or without opium, is a valuable medicine. When the bowels are also irritable, opium or morphia may be combined with the creasote with advantage; but, in other cases, the latter may be given with bitters and aromatics. *Hydrocyanic acid* may also be prescribed in similar combinations. If *diarrhœa* be present, opium, cretaceous mixtures or powders, lime-water, and aromatics, are requisite. In either of these affections, also, embrocations or fomentations may be applied over the epigastrium and abdomen, consisting chiefly of rubefacient and discutient substances, as the turpentine embrocation, &c. In the more obstinate cases of diarrhœa, the sulphate of zinc or of copper, or the nitrate of silver, or the acetate of lead, may be given with opium, &c. If *peritonitis* supervene, vascular depletion ought to be promptly prescribed; but with the knowledge, that in most states of the disease, and in the more advanced stages especially, the loss of blood is not attended by much advantage. This is particularly the case if the dropsical effusion is considerable, and leucophlegmasia or cachexia manifest. The peritonitis, in these circumstances, is most successfully combatted by fomentations with warm turpentine applied over the abdomen, and by opium with camphor taken internally. Lesions of the *liver* or *spleen*, even when recognised, are hardly influenced by medicine, when associated with this malady. The exact nature of the hepatic lesion frequently cannot be ascertained during life; and, even if correctly inferred, the most appropriate treatment is neither manifest nor generally beneficial. In these, as well as in other unfavourable complications, the chief indication is to support the powers of life by attention to diet, by residing in a dry and warm air, by taking gentle restoratives with alteratives, and by attending to the alvine excretions.

165. *b. The Associations of this Disease with Affections of the Respiratory Passages and Lungs* require the most cautious use of the remedies usually prescribed for either the former or the latter; and those which are most serviceable for the one are most injurious for the other.—*α. Bronchitis* is generally extended to both lungs; and, although it may be slight for a time, it may be suddenly aggravated so as speedily to terminate life. In most cases, the treatment advised for the more asthenic states of BRONCHITIS (§ 81. *et seq.*) should be prescribed.—*β. Pneumonia*, also, when it occurs, generally affects both lungs, and is often of the kind usually denominated asthenic or nervous. Unless in the earlier stages of the nephritic disease, and in the more robust subjects, vascular depletions are seldom beneficial in these complications. A free use of tartar-emetic, aided by external derivation, is much more deserving of confidence, especially in pneumonia, than depletions; but all means often fail in these cases. —*γ*. The same remarks are applicable to *pleuritis*, when it appears in the course of this malady. The disposition to effusion requires the prompt use of suitable means; but these means are not the same as are generally found serviceable in the early stages of common pleurisy. Blood-letting and mercury must be sparingly, cautiously, or not at all prescribed; whilst the repeated application of blisters, of the turpentine fomentation, &c., and a recourse to the hydriodate of potash internally, with other means suggested by circumstances, are most to be depended upon.—*δ*. When the nephritic malady arises in the course of *phthisis* (§ 125.), the latter is generally accelerated in its progress, whatever treatment may be adopted. As diarrhœa still continues to be more or less distressing, astringents, absorbents, and opiates are requisite, especially the sulphate of iron or of copper, with opium and creasote. The consecutive anasarca is commonly attended by a subsidence of the colliquative perspirations, and is sometimes diminished by a frequent recourse to the vapour-bath; but the benefit is never permanent. Indeed, no plan of treatment is found of lasting service in this complication. I have employed the *Mistura Ferri Composita*, or other preparations of iron, conjoined with other medicines suited to the circumstances of the case, in this complicated state of disease; and although in some instances benefit was manifestly derived from them for a time, an unfavourable issue ultimately occurred.

166. *c. The Associations of Cachectic Nephritis with Diseases of the Heart and Vascular System* (§ 126.) are no less hopeless than those with maladies of the lungs. The lesions of both the kidneys and the heart are reciprocally aggravated by association with each other. Even when re-

cognised during early periods of the complication, treatment has little influence in arresting or in impeding the progress of either. The means most influential in producing the latter effect are those which promote digestion, assimilation, and free excretion. To support the powers of life, and, at the same time, to procure the discharge, by the several emunctories, of unassimilated, effete, and injurious matters, are the chief intentions by which the treatment can be directed. These being recognised and guiding our practice, the choice of means should altogether depend upon the features of individual cases.

167. *d. The Association of this Disease with Cerebral Affections* (§ 131.) is chiefly contingent upon the acute state of the former, and are then owing to imperfect assimilation and excretion, and to consequent excrementitious plethora; congestion or serous effusion being thereby much more frequently produced than organic lesion of the brain itself. In those more acute states of this complication, cupping over the mastoid processes, or on the nape of the neck, blisters in these situations, active purging, stimulating embrocations on the loins, and the other means advised for the acute form of this malady (§ 153.), are to be chiefly resorted to. When cerebral affections occur in the advanced course of the chronic state of cachectic nephritis, they depend almost entirely upon exhausted vital power, in connection with vascular inanition; coma or lethargy being the most frequent forerunners of dissolution.

168. *e. Cachectic Nephritis consequent upon Scarlet Fever* (§ 133.) is the most favourable form of this malady; and when it assumes the *acute state*, the treatment should not materially differ from that advised above (§ 167.). General or local blood-letting, purgatives, vapour or warm baths, diaphoretics, diuretics, and warm demulcents, the warmth of bed, warm flannel clothing, and removal to a warm dry air, are the chief means of cure. If the disease be unattended by fever, if it become *chronic*, and the powers of life sink, stimulants and restoratives, particularly the tincture of the sesqui-chloride of iron, with the tincture of cantharides, warm medicated baths, embrocations, blisters, &c. over the loins, are then required. If complications appear in this state of the disease, they must be treated conformably with the principles already insisted upon; but this subject is more fully discussed in the article on Scarlet Fever.

169. *f. The Treatment of the other Associations of Cachectic Nephritis* mentioned above hardly requires further remark. When the disease is very obviously complicated with *scrofula*, and particularly with scrofulous abscesses or ulcerations, the Mistura Ferri Composita, liquor potassæ with small doses of the iodide of potassium, sarsaparilla, the iodide of iron, &c., and other restorative remedies, with change of air, or change to a dry and warm atmosphere, and attention to the digestive, assimilating, and excreting functions, are most deserving of attention. The frequent occurrence of the disease in the scrofulous diathesis indicates the propriety of having recourse to the same means as have been found most beneficial in scrofulous affections. — The appearance of cachectic nephritis during secondary *syphilis* (§138.), or consequent upon it, although occasionally observed, has not been satisfactorily elucidated; inasmuch as it is not proved whether or not the renal disease is a consequence of syphilis, or of the inordinate use of mercury in the treatment of it. The two cases alluded to above (§ 138.) occurred in scrofulous constitutions; mercury was largely employed; the secondary symptoms became aggravated, phthisis supervened, and in this state they came under my care. Hydriodate of potash with sarsaparilla was then prescribed, and, during the use of it, and in an advanced state of the pulmonary disease, albuminous urine and anasarca appeared. These cases prove only the tendency of this disease to appear whenever a state of general cachexia is produced by causes depressing vital power, and impairing the assimilating processes so as to overturn the healthy crasis or constitution of the blood.—I have never met with an instance of this disease connected with *rheumatism*, unless where the treatment has been of a lowering kind; and in this complication the preparations of iron, quinine, and camphor, have been generally prescribed with greater benefit than any other medicines. I have generally preferred the following, or similar combinations: —

No. 283. ℞ Ferri sulphatis: — Quiniæ sulphatis, āā, ℈j.: — Camphoræ rasæ, ʒss.: — Extr. Aloës purif. ℈j.: — Extr. Humuli (vel Extr. Hyoscyami), ℈ij.: — Mucilag. Acaciæ q. s. — *M.* Contunde bene et divide in Pilulas xxxvj. quarum capiat duas vel tres, bis terve quotidie.

170. III. Inflammation of the Pelvis and Calices of the Kidney. — Synon. — *Pyelitis* (from πύελος, pelvis). — *Pyelite*, Rayer. — *Pyelitis*, Prout.

171. Inflammation of the mucous membrane lining the pelvis and calices of the kidneys is distinct from the species of nephritis already described, not only in its seat, but also in its symptoms and consequences. It sometimes assumes an *acute form*, but more frequently a *sub-acute* or *chronic state*. It may affect the pelvis and calices of only *one* kidney or of *both*; and it may be limited to a portion only of their surface, or extended to several calices.

172. i. Symptoms. — Pyelitis assumes varied states, according to its grade of activity, its causes, and other circumstances. It sometimes attends or supervenes upon *catarrhus vesicæ*, or inflammation of the mucous surface of the bladder; and it sometimes even follows *gonorrhœa*, especially when suddenly checked by astringent injections, and *retentions of urine* from strictures or other causes. But it occurs in its most definite and best marked form when it proceeds from the irritation of sabulous or calculous matters in the excretory portion of the kidneys, or is connected with the oxalic acid diathesis. It is occasionally also connected with certain cutaneous affections remotely allied to syphilis.

173. *A.* When pyelitis supervenes upon *catarrhus vesicæ*, or upon *gonorrhœa*, the symptoms are usually uneasiness, or more or less pain and sense of heat in the loins, attended by low febrile action, sympathetic irritation of the testicles, and sometimes by nausea, particularly when the secretion of mucus or muco-puriform matter is unusually large. If the inflammation of the mucous surface of the bladder still continue, the symptoms referable to this viscus predominate, and often mask those more immediately connected with the kidneys. In all cases the symptoms should be examined in connection with the states of the urine.

174. *B.* When pyelitis arises from the *irritation of calculous or sabulous substances* in the excretory portion of the kidneys, the symptoms vary with the constitution and age of the patient, and with the nature and form and situation of those substances. When a calculus or calculi are situated so as not to obstruct the passage of urine from the organ, the inflammation is frequently slight and limited in extent. But when it is large, and is situated at the outlet of the pelvis, or at or in the commencement of the ureter, so as to obstruct more or less, or entirely to close, this opening, the parts above the obstruction generally become inflamed throughout, and distended by urine, mixed with mucus, and often with puriform matter and blood. In these cases, the kidney is greatly increased in bulk, and the local and general symptoms aggravated.

175. Pyelitis, *from calculi*, may be slight, and not exceed a state of irritation not amounting to that grade of inflammation developing general febrile reaction. In such cases the gravelly matters pass from the calices into the pelvis, and thence, by the ureters, into the bladder, occasioning only more or less pain in their transit. But when the calculi, from their size, sharpness, or roughness, irritate greatly these parts, or cannot readily pass along them, inflammatory action, with more or less severe symptoms, is produced.

176. *a.* In the *more acute* cases, a sharp, severe, or lancinating pain is felt in the region of either kidney, descending thence, in the course of the ureter, to the bladder, attended by chills or rigors more or less marked. The urine is scanty, voided by drops, with a sense of heat, sometimes with gravelly matter and a small quantity of blood. The pulse, at first small and oppressed, becomes developed and more frequent, and febrile action supervenes, especially after nausea and vomiting have occurred. If the calculus or gravel is not voided in the course of the following two or three days, the symptoms continue; and if it does not entirely shut up the passage to the bladder, and if only one kidney is thus affected, the urine always contains some mucus and blood. On cooling, the mucus appears in the urine in the form of flocculi, which afterwards fall to the bottom of the vessel; and the blood-globules, when present, form a slight layer on the surface of the sediment. All these symptoms may quickly cease when the calculus has passed into the bladder, and the urine becomes natural.

177. *b.* When calculi remain in the calices or pelvis for a considerable time, the inflammation becomes *chronic*, and the pain ceases to be acute. The patient complains chiefly of uneasiness or of weight in the region of either kidney; but pain, sometimes obtuse, at other times sharp, occurs upon a sudden effort, or unusual movement of the trunk, or when riding either in a carriage or on horseback; and the pain generally extends to the bladder and the course of the ureters, and to the testes and limb corresponding with the affected organ. Numbness as well as pain of the limb is often also felt. Decubitus on the abdomen, or on the side opposite the affected organ, where one only is affected, straining at stool, coughing, sneezing, a deep inspiration, the warmth of bed, &c., generally augment the pain; which, however, may be slight, although several calculi are contained in the pelvis and calices. These pains, thus varying in severity and character—being occasionally slight, sometimes colicky and severe — frequently are independent of any febrile action; but they are usually attended by retraction of the testes, and by a reddish, scanty, and mucous state of the urine, which is slightly coagulable by heat. Sometimes the urine is sanguineolent; at other times it is perfectly transparent, particularly after diluents and demulcents have been freely used. These different states of the urine may be observed in the same person in the course of twenty-four hours. Upon cooling, uric acid, or the salts, are deposited with the blood and mucus, these latter forming the surface of the sediment.

178. When the gravel consists of *uric acid*, as is most frequently the case, the urine is acid, and the sediment contains rhomboidal crystals of a yellowish-red colour. When it consists of the *phosphates*, the urine is alkaline and turbid at the time of emission. Dr. PROUT observes, that when the concretion is lithic acid, the quantity of mucus in the urine, though considerable, is not so striking and characteristic as it sometimes is when it consists of the oxalate of lime. This arises, partly, perhaps, from the diminished quantity of mucus secreted, and partly from the quantity of lithate of ammonia and other matters usually present, which involve and conceal it. Where the calculus is oxalate of lime, the mucus is sometimes voided in large transparent greenish gelatinous masses of considerable tenacity, which occasionally, in passing down the ureter, excite all the acute symptoms. When the renal concretion consists of phosphate of lime, the symptoms are much the same, and the mucus often contains the earthy matter intermixed with it in considerable quantity.

179. *c.* At a more *advanced stage of chronic* pyelitis from calculous concretions, irregular chills or rigors occur, especially towards night or after a meal; and various morbid sensations are felt in the loins — as of pulsation, of tension, of numbness, and even of cold — which often extend down the corresponding thigh. The urine is sometimes sanguineolent, but oftener turbid and whitish, allowing a puriform and white, or slightly greenish-white, sediment to fall, consisting chiefly of pus and urinal salts. The discharge of blood in the urine is occasionally the first remarkable symptom, especially when the pelves of both kidneys contain calculi. Subsequently the urine becomes turbid and puriform, and passes frequently and in small quantity, with or without sabulous matter in it. In the course of the disease, the patient experiences *exacerbations*, characterised by more acute symptoms, by vomiting, and fever.

180. The urine is usually bloody or purulent every time that it is voided, unless one kidney only is affected; and the secretion from the diseased one is partially or entirely interrupted. Great variations, however, both in the frequency of the calls to pass the urine, and in the physical and chemical characters of it, are observable. When purulent urine coming from the inflamed pelvis of a kidney is retained only partially in its cavity, it is mixed in variable proportions with the urine from the other kidney, which may be then perfectly healthy. Hence the urine may, in the course of the same day, be different in appearance at different times—it may be charged with pus or blood, or with both, at one hour, and be clear and healthy at another hour. The urine, therefore

should be frequently inspected. In some cases, M. Rayer states, the suspension for a time of the unhealthy urine is accompanied with an aggravation of the renal distress, and with a febrile state of the system; probably in consequence of the ureter of the affected organ becoming obstructed, and the urine therefore accumulating in its pelvis. The symptoms usually subside when the urine exhibits a purulent admixture. When this fluid is at all purulent, it is found also albuminous; the amount, however, of the coagulum produced by heat or nitric acid is by no means proportionate to the quantity of purulent matter in it.

181. *d.* When chronic pyelitis has existed for a long time, and the excretion of urine along the ureter is much obstructed either by the presence of a calculus in it or in the pelvis, or by any other cause, a swelling may sometimes be distinctly felt in the lumbar region, the swelling occasionally evincing an obscure fluctuation, and appearing irregular or lobular on examination. This tumour is formed by the accumulation of puriform matter in the cavity of the pelvis and calices of the kidney; and, when very large, is felt in the corresponding flank, where it may extend from the margins of the ribs to the iliac fossa. M. Rayer has seen tumours formed by purulent matter distending the pelves and calices of the kidneys weighing as much as from ten to fifty pounds. Owing to the developement of such tumours, the lumbar region is more or less swollen, enlarged and deformed on the affected side. On percussion, the swelling emits a dull sound behind, and generally also anteriorly, unless the colon, distended by air, pass before it. When, however, the tumour is large, the colon is generally pushed aside by it. The right kidney, when thus distended, sometimes adheres to the margin of the liver, and thus seems, on percussion and palpation, to form one structure with this organ, and is often mistaken for a tumour, or for enlargement of it. Tumour thus formed of the left kidney is not so readily mistaken for enlargement of the spleen, unless the examination is very superficial. When the tumour is very large, it generally seems knotted or lobulated, and fluctuation may be perceived in it. Pain is rarely acute in this state, although it may be produced by pressure or succussion of the trunk.

182. *e.* In a few instances, the mucous membrane of the pelvis and calices of the kidney surrounding the calculus becomes thickened, indurated, so as to secrete little or no purulent matter; and these parts form, with the atrophied substance of the kidney, a sac or shell, more or less closely surrounding the calculus. If the opposite kidney is healthy, this change may not be even suspected during life, the patient experiencing no pain, and the urine containing no pus; but if disease, calculus, or obstruction affect the sound organ, suppression of urine and death soon take place. In the less severe and chronic cases of the disease, suppression of urine and death may also occur, especially when both organs are seriously affected, or when calculi obstruct both the pelvic outlets or ureters.

183. These *several states of pyelitis* may be denominated nearly as M. Rayer has named them — 1st, Pyelitis characterised by sharp pain, or nephritic colic, and suppressed or scanty urine (§ 176. *a.*); 2d, Pyelitis with mucous urine and occasional pain (§ 177. *b.*); 3d, Pyelitis with purulent urine, and without renal tumours (§ 179. *c.*); 4th, Pyelitis with purulent urine and with renal tumour (§ 181. *d.*); and 5th, Atrophy of the kidney, the urine being generally clear (§ 182. *e.*).

184. ii. Diagnosis. — Pyelitis may be mistaken for several other diseases; for a *mucous* or *purulent* state of the urine attends inflammation of the bladder or urethra; and lumbar *pain* exists in rheumatism, nephralgia, &c. *Tumour* of the lumbar region also proceeds from diseases connected with the kidney. — *A.* — *a. Pain* in *acute simple nephritis* is sometimes as severe as in pyelitis, but seldom as severe or as sharp as in pyelitis caused by calculi. In this latter, the pain occurs in paroxysms, or presents exacerbations, and is more disposed to shoot in the direction of the ureter, and to be attended by retraction of the testes of the corresponding side. The existence of mucus or purulent matter in the urine will also assist the diagnosis. — *b.* True *Nephralgia* may be confounded with calculous pyelitis; but generally the pain of the latter is more acute and cutting or lacerating than in the former, and is obviously connected with gravel, calculi, and other changes of the urine, above described; whilst the former very rarely occurs, unless in connection with hysteria or with irritation of the uterus. — *c.* In *lumbago* the pain commonly affects both sides alike and at the same time, instead of being felt chiefly or altogether in one side, as in pyelitis; is more continued, and does not extend, in the course of the ureter, to the bladder; and it is exasperated by the movements of the trunk. Lumbago is generally without fever, and often preceded by rheumatic pains in other parts. — *d. Hydatids* in the kidneys are seldom attended by much pain, unless they pass into the pelvis of the organ, and occasion inflammation there or in the calices; where the pains — although less acute — and the other symptoms are nearly the same as in calculous pyelitis. The passage of hydatids with purulent urine will generally indicate their source in the kidneys, when pain is referred to the renal region: but not with certainty, for they may come from cysts connected with the bladder, but this is a very rare occurrence. — *e.* In some rare cases of *suppression of urine* the pain in the region of the kidneys has been severe, and the patient has been carried off by cerebral affection; and yet all the structures of the kidneys have been found free from marks of inflammation. In some cases, very large calculi may lodge in the pelvis without causing either much inflammation or much pain. Occasionally, also, the pain has been felt in the situation of the opposite kidney to that which contained the calculus, or in some part still more remote from the irritated organ. Instances where very large calculi were formed in the kidneys without having produced any marked symptoms, or even much disorganization, are recorded by Baglivi, Houlier, Henrie, Boralli, Pozzi, Morgagni, De Haen, Van Swieten, Howship, and others.

185. *f. Caries of the vertebræ* is generally attended by a dull pain, but it cannot be mistaken for pyelitis unless paraplegia, with retention of urine, and changes in this fluid, take place, and then pyelitis may actually supervene. The state of the vertebral column, and abscess appearing in

some one of its usual situations, will generally show the nature of the disease. — *g. Psoitis* is accompanied with pain, which is continued and often severe, extending from the lumbar region to the pubis and top of the thigh, the trunk being bent forward, and to the affected side. Motion of the thigh is extremely painful, and œdema of the limb often occurs. If suppuration take place, the abscess increases the œdema, but its situation is lower, and more anteriorly than that of the puriform collection in the pelvis of the kidney consequent upon pyelitis. If the abscess open into the bladder, the diagnosis will be more difficult, as in a case recorded by Mr. Howship. — *h. Aneurism* of the *abdominal aorta* gives rise to pain, very much resembling nephritic colic, or the renal pain attending calculi in the kidney. The pulsation of the tumour, the evidence furnished by auscultation, and the state of the urine, will, however, indicate the disease. When tumour is inconsiderable or absent, the nature of the lesion is obscure, particularly in its early stages. — *i.* Inflammation of a portion of the *colon* in the vicinity of the kidney can hardly be mistaken for pyelitis, for the state of the bowels, and the appearance of the urine, will prevent them from being confounded with one another. — *k. Hysterical pains* in the region of the kidneys are characterised by abundant, pale, and transparent urine, and by other indications of *hysteria* (see the article). Hysterical patients are, however, liable to disorder of the *excretion* of urine, but not to those *characteristics* of this fluid attending inflammations of the kidneys; and they are prone to attempt various deceptions connected with the performance of this function.

186. *B.* The excretion of *mucus* and *muco-puriform or purulent matter* in the urine may take place in other diseases besides pyelitis, and especially from *acute* or *chronic inflammation of the bladder*, which may simulate disease of the kidneys; this latter also, in its turn, often simulating disease of the bladder. In all cases it is most difficult to determine, by the appearance of the urine only, whether the kidney or the bladder is inflamed; in some cases both are affected, although not equally. In most instances, the urine is glairy and viscid in *cystitis*, and there is pain or uneasiness in the bladder, but there is no pain or swelling in the loins, nor any of the sympathetic feelings depending upon pyelitis. The urine is generally less puriform and opaque than in this latter disease, the dysuria attending which being usually connected with the presence of pus. However, if the puriform urine of pyelitis be alkaline, it will become both glairy and viscid; and the secretion from the inflamed surface of the bladder is not always glairy. The absence of pain in the region of the bladder, whilst severe or sharp pain is felt in either lumbar region, will also assist the diagnosis.

187. *C.* The *tumours* consequent upon chronic pyelitis, with occlusion of the outlet of the pelvis or ureter, may be confounded with others, and it is sometimes of importance to form a correct diagnosis between them. — *a.* M. Rayer remarks that a collection of urine in the pelvis of the kidney, owing to obstruction of the ureter (*hydronephrosis*), causes a tumour or enlargement of the lumbar region, very closely resembling that produced by an accumulation of pus in the same situation; that both are lobulated, dull on percussion, and evince fluctuation; but that the latter is the seat of occasional pain, or becomes painful on pressure, and is attended by fever — phenomena which seldom accompany the collection of urine merely. Besides, when the passage from the kidney is not entirely obstructed in pyelitis, the urine is somewhat puriform and opaque. — *b.* An *abscess* seated in the cellular tissue in the vicinity of the kidney may be mistaken for purulent collection in the pelvis of this organ. But, in the former, fluctuation is more superficial and manifest than in the latter, and there is generally œdema of the sub-cutaneous cellular tissue in the lumbar region, an œdema never met with in the latter. Cases, however, may occur of an abscess forming externally to the kidney in connection with an accumulation of purulent urine in the pelvis and calices; but these are rare, and occur chiefly when a fistulous opening is formed between the pelvis and the adjoining cellular tissue. Ulceration, caused by calculi, penetrating the pelvis may give rise to abscesses which may open either externally or into the colon, or even into some other viscus; and one or more renal calculi may be voided in these situations, either subsequently to, or along with, the discharge of pus. The origin of these fistulæ is shown by the urinous odour of the discharge and by the presence of uric acid, or of the urinous salts, or of calculi: still these signs may be wanting for a time, although one or other of them may recur from time to time.

188. *c. Stercoraceous abscess* may form in the vicinity of the kidney, owing to perforation by ulceration of a part of the colon. If such abscess point externally, the diagnosis will be easy; for the escape of fæcal matters and of intestinal gases will show its nature. *Abscess* consequent upon *caries* of the *vertebræ*, and abscess arising from *psoitis*, may be distinguished by the history of the case, by the antecedent symptoms, especially as regards the state of the vertebræ and the movements of the thigh, and by the other phenomena already alluded to (§ 185.), particularly those connected with the excretion and state of the urine.

189. *d. Tumours*, or swellings in the region of the kidney, may proceed from *other diseases* than the above, and render the diagnosis of distension of the pelvis and calices of this organ by puriform matter more or less difficult. These diseases are *cysts* in or near the kidney, containing *hydatids*; simple, or *serous*, or *urinous cysts* of large size; tumours developed in the *supra-renal capsules*; *aneurisms* of the abdominal *aorta*; *enlargements* of the *spleen*; *tumours* or *cysts* connected with the right lobe of the *liver*; enlargement of an *ovary*; accumulations of *fæcal matters* in the *cæcum* or *colon*; and *extra-uterine* pregnancy. Of all these, it is unnecessary to take particular notice. The recollection that these may severally closely resemble, in their situation and local signs, the consequences of chronic pyelitis now under consideration, and the attention to the existing phenomena which the recollection will excite, cannot fail of guiding the practitioner to a right conclusion. The history of the case, the sympathetic pains, the states of the stomach and bowels, and, above all, the appearances of the urine, and the circumstances attending the excretion of it, will

receive from him the fullest consideration, and serve to point out the seat of disease.

190. iii. Prognosis.—*Pyelitis* in its *first* or more *acute form* (§ 176.), arising from urinary concretions, is generally not attended by danger when one kidney only is affected. But the *second* and more especially the *third* and *fourth* states of the chronic disease are always of more or less serious moment even when one kidney is implicated: if both organs are diseased, the prognosis is still more unfavourable, for the contingencies of ulceration of the pelvis of the kidneys, of atrophy of their structure, of suppression of urine and its consequences, and various other results of less frequent occurrence, are to be expected in a large proportion of such cases. Anticipations should be still more unfavourable if a puriform collection in the pelvis of the organ arise from obstruction at its outlet, and thus form a tumour in the loins, unless it opens externally: in this latter case, it often terminates favourably. The *complications* of *chronic pyelitis* with other lesions of the kidney or of the urinary organs, or with other maladies (§ 192. *et seq.*), render the prognosis extremely unfavourable.

191. In cases of *tumour* or *abscess* of the kidney consequent upon the obstruction of a calculus, as described above (§ 187.), suppuration and ulceration may proceed, as already mentioned; and if the swelling point in the loins, the calculus or calculi may escape in this situation, by the spontaneous or artificial opening of the abscess, and the patient recover. Proceeding upon the results of such cases, some physicians have recommended either that an incision should be made into this tumour at a proper period of its progress, or that caustic should be used in opening it. Each of these modes of procedure may be resorted to, and be successful in cases to which they are severally appropriate. It is most probable that, in the successful cases of these operations on record, the calculi had passed by ulceration from the pelvis of the kidney into the cellular tissue exterior to it, and that they had been extracted from an extra-renal abscess formed by it.

192. iv. Complications.—*A.* Inflammation of the pelvis and calices of the kidney occurs more frequently in connection with inflammation of the vascular and tubular structures than in a simple or uncomplicated state; or, in other words, *pyelonephritis* is more common than either *simple nephritis* or *simple pyelitis.*—*a.* When *pyelitis* is the primary affection, *nephritis* often supervenes; and, as a consequence of the former, or of pyelonephritis, *atrophy* of the cortical and tubular structure is the most frequent. Ulceration and *perforation* of the pelvis of the kidney is less common than atrophy of the organ; but, when it takes place, abscess external to the kidney generally forms, with or without the escape of the calculus that caused it. Although only one kidney is affected, still functional disorder may at the same time be extended by sympathy to the other. *Calculous pyelitis* of both kidneys is not rare. M. Rayer refers to several instances of the double malady. In the more prolonged cases of chronic pyelitis of one organ, the other either remains healthy or is *hypertrophied* consequently upon increased function.

193. *b.* Pyelitis is often attended by *hæmorrhage* from the kidney, particularly when caused by calculi; and the hæmorrhage may prove critical of pre-existing *pyelo-nephritis*, the inflammation of the substance of the organ being abated or altogether removed by the discharge. This association has been aptly named by M. Rayer *Hæmorrhagic pyelitis* and *Hæmorrhagic pyelo-nephritis*, and is certainly not of unfrequent occurrence in connection especially with calculi in the kidney, although the sanguineous state of the urine constitutes apparently the chief, but actually the least important, part of the malady.

194. *c. Pyelitis*, in any of its states, may be associated with disease of the *prostate gland*, or of the *bladder*, or of the *urethra*, or of all of them, and these affections may be further complicated with stone in the bladder. In the majority of such cases, the *ureter* or ureters are also affected, being either *dilated* or *constricted*, or both dilated and constricted in different or alternate parts. Sometimes the coats of the ureters are *thickened;* and occasionally a complete obliteration of the canal of one of them is found in some points, which are either occluded by a whitish firm albuminous deposit, or are reduced to a fibrous chord. Mr. Coulson very ably remarks, that when an urinary *vesical calculus* has been formed for years, and has brought on severe symptoms, and especially when attended by stricture of the urethra, or enlarged prostate gland, the kidneys, though before healthy, become involved; the severe dysury causes enlargement of the ureters from distension of the retained urine, and inflammation extends along them, even to the kidneys themselves. The pelvic cavities become altered in shape and enlarged, the infundibula extended or unfolded, and the internal membrane of all the cavities thus acted upon, from repeated attacks of inflammation, is thickened, and furnishes a catarrhal secretion. The parenchymatous substance of the kidney is more or less absorbed, the mammary projections are obliterated, spurious hydatids occupy the cortical part, and all the serious evils, ulceration, contiguous abscess, or gangrene, are met with as sequelæ of vesical calculus.

195. When pyelitis is associated with inflammation or other diseases of the *bladder* or *prostate gland*, the severity of the symptoms in these organs may render obscure or altogether mask the affection of the kidneys; and this is the more likely to be the case, inasmuch as pyelitis is commonly the consecutive or superinduced malady: and it may even continue after the disease of the bladder has been removed. It is a more rare occurrence for pyelitis to propagate itself along the ureter, so as to occasion *true cystitis*, and it is met with chiefly when sabulous or gravelly matters, occasioning pyelitis, pass into the bladder and inflame it or the urethra, or when purulent matter from the pelvis of the kidney produces the same effect, which, however, seldom arises unless this matter is retained for some time in the bladder, or undergoes some degree of decomposition, or occasions an ammoniacal state of the urine, or unless the urine is more or less alkaline when it passes into this viscus. It should be recollected that, when great irritation is produced by calculi in the kidneys, severe symptomatic pains are sometimes felt in the bladder, without any actual disease existing in it; but it is much more common to find very serious lesions in the kidneys, although no pains in the loins had been complained

of, disease of the bladder, or calculus there, being the only apparent malady. Thus it has happened that able surgeons, before undertaking the operation of *lithotomy* or of *lithotrity*, have examined attentively the regions of the kidneys, without detecting any sign of disease of these organs; and yet, after the operation has been performed, a violent rigor, or shiver, has taken place, followed by fever and death; and, upon dissection, not only have calculi and pus been found in the pelvis of the kidney, but also the substance of the organ has been more or less inflamed, or otherwise altered. These *latent states* of pyelitis occur not only in connection with vesical calculi, but also with other maladies of the bladder and prostate gland; and they are *latent* merely from want of due attention to, or due knowledge of, the states of the urine attending the renal disease, this fluid generally containing purulent matter, or pus globules, readily miscible with it, and very distinct from the glairy mucous sediment accompanying chronic cystitis — the urine in pyelitis being puriform, that of cystitis being mucous and glairy: when, therefore, the one disease is complicated with the other, there is commonly a mixture of puriform matter with a mucous or a glairy substance; and the one predominates over the other, according as the one disease is more severe than the other. Some modifications, however, of the urine in these diseases, and in their complications, arise from the saline constituents or deposits, which often change the appearances of those morbid secretions, an alkaline state rendering purulent urine more glairy than its acid or neutral conditions. Moreover, it should be recollected that, in very chronic and prolonged cases of cystitis, the urine is often more or less purulent, or contains pus globules mixed with mucus.

196. Whenever disease of the bladder or of the excretory urinary canals is attended by retention of urine, there is a great risk of the supervention not only of pyelitis but also of nephritis, as a consequence of, and in connection with, pyelitis, — either this latter simply, or pyelo-nephritis, occurring as a result of the disease of the excretory urinary apparatus; and the malady, thus superinduced in the kidneys, may be *acute* or *subacute* in the one organ, and *chronic* in the other.

197. *d.* Calculous pyelitis, in any of its forms, may be associated with *pregnancy;* for, when there are calculi in the kidneys, they are more likely to give rise to inflammatory irritation at this period than at any other; unless indeed, soon after delivery, when calculous pyelitis occasionally takes place.

198. *e.* Pyelitis is sometimes complicated with other diseases; but it is unnecessary to describe fully the phenomena attending it when thus associated. A bare enumeration of the maladies with which it is most frequently connected will serve to direct attention to the subject, and will suggest to the physician when such complications may exist or supervene. Pyelitis may occur after injuries or diseases of the spine; and may be further associated with lesions of the bladder and prostate gland. In all such cases, especially when interruption of the excretion of urine takes place, cerebral affections of a most dangerous kind are apt to appear. Disorders of the digestive organs, gout, diseases of the vascular system, and fevers, are not unfrequently connected with pyelitis; indeed there is scarcely a malady which may not be complicated with it, particularly in persons far advanced in life.

199. *B.* PYELO-NEPHRITIS, or *inflammation of the pelvis, calices, and substance of the kidneys,* is the most important of the above complications, and occurs oftener than either nephritis or pyelitis simply. — *a.* In pyelo-nephritis, the inflammation generally commences in the pelvis and calices, and rarely in the substance of the organ. Hence it generally proceeds from the same causes as are productive of pyelitis, as the irritation of calculi, interruptions to the excretion of urine, and inflammation propagated from the urethra, bladder, or ureters, &c. It is more prevalent in males than in females, and in persons advanced in age than in the young. In these respects, however, it agrees with the other forms and complications of *nephritis,* deaths from this disease, according to Mr. FARR's letter to the Registrar-General (*Third Annual Report of Births, Deaths, &c.*), being in the proportion of 21·20 males to 7·60 females, or nearly 3 to 1, in the years 1838 and 1839; and from diseases of the *urinary organs* generally being 1275 in the former to 259 in the latter, or 12·750 to 2·590, or about 6 to 1, in the same years.

200. *b.* Pyelo-nephritis may be either *acute* or *chronic;* it may be limited to one kidney, or extended to both; and it may be more or less acute and severe in one organ than in the other: it may, moreover, present the following states, according to its *causes* and prominent *characters:* it may be, — 1st, simple inflammation of the pelvis, calices, and proper structures of the organ; 2d, inflammation of these parts in connection with gravelly or calculous substances; 3d, inflammation accompanied with hæmorrhage, or hæmaturia; and, 4th, inflammation with a disposition either to albuminous exudations or to gangrene, according to the state of constitution of the individual and intensity of the disease. Of these, the last is the most uncommon.

201. *c.* In these forms of pyelo-nephritis, mucus and pus globules may be detected in the urine; but they will not be observed in simple nephritis, or when the inflammation does not extend to the calices and pelvis of the kidney. When pyelo-nephritis follows lesions of the urethra, prostate, or bladder, it commonly extends to both organs, but both do not present the same extent and grade of inflammation. When it proceeds from injury, or when the disease commences in the cortical and tubular structure — a comparatively rare circumstance — and extends to the calices and pelvis, or when it is caused by calculi, then only one kidney is generally affected.

202. *C.* PERI-NEPHRITIS, or *inflammation extending to the fibrous, cellular, and adipose tissues surrounding the kidney,* rarely occurs, unless after injuries or wounds implicating this organ and those tissues, and when calculous pyelitis is followed by ulceration and perforation of the pelvis of the kidney, and by *renal fistula.* It is chiefly in these circumstances that peri-nephritis is usually met with, and it is then associated either with nephritis, or with pyelitis, or pyelo-nephritis.

203. *a.* It rarely appears in a *primary* and *simple* form, and as rarely can be detected as such during life, or until it passes into abscess, when it assumes nearly the form of abscess consequent upon pyelitis with perforation of the pelvis of the kidney

(§ 187.). Instances, however, have been recorded of primary inflammation of the *cellulo-adipose* substance surrounding the kidney after injuries, and the impression of cold; but it is more common as a consequence of the passage of purulent matter into the circulation, of severe fever or erysipelas, of ulcerative perforation of the colon; and in these circumstances it has been found chiefly upon examination after death. Peri-nephritis more frequently follows caries or fracture of the vertebræ, and in these, as well as in other circumstances of its occurrence, generally gives rise to abscess of greater or less extent. When this takes place, fulness or swelling of the loin of the affected side, with obscure fluctuation and œdema of the sub-cutaneous cellular tissue over the part, is usually present. When abscesses form in this situation, they may involve the kidneys, pelves, and ureters, more or less, and they may extend to and open in immediately adjoining viscera, or parts considerably remote.

204. *b.* When peri-nephritis is *simple*, or has not involved the kidney, pelvis, or ureter, and is independent of disease of these parts, it is generally obscure. The urine does not present the characters marking the presence of nephritis or pyelo-nephritis; but there is much tenderness of the loin and symptomatic fever, soon followed by œdema and swelling. As soon as purulent matter forms, it increases, and accumulates between the peritoneum and lumbar muscles; and it may thence extend to the iliac fossa or crural arch; or it may open into the peritoneal cavity, or into the colon or rectum; or it may make its way in other directions, as in the lumbar region, or at or near the angle formed by the spine and posterior part of the crest of the ilium, on either side of the lumbo-sacral or lumbo-iliac ligaments. When the abscess is opened early in these situations, particularly the latter, recovery may take place; but this result will depend chiefly on the nature of the original disease, or of its causes and associations. These abscesses have usually been denominated *lumbar* or *psoas abscesses*, and are more fully noticed in the article Abscess.

205. *c. Gangrene* is a much rarer termination of peri-nephritis than suppuration. In a remarkable case of the primary and simple form of this malady — the inflammation apparently commencing in the cellulo-adipose tissue surrounding both kidneys — recorded by Dr. Turner (*Med. Trans. of Coll. Phys.*, vol. iv. p. 226.), the disease followed exposure to a current of cold air after being overheated by prolonged exercise on horseback. Severe pains were felt in the loins, and the symptoms were altogether violent and obscure. The urine was natural in quantity, and there were no unusual calls to pass it. Death speedily ensued. On examination, the cellulo-adipose tissue surrounding both kidneys was found quite gangrenous: the capsules of both organs were inflamed; but the substance of the kidneys was only slightly inflamed.

206. *d. Peri-nephritis* may, therefore, arise from inflammation extending from the kidney to the surrounding cellulo-adipose tissue; but this rarely occurs, unless the pelvis of the kidney is perforated by ulceration, especially in calculous pyelitis, as shown above (§ 187.); and when such perforation occurs, a *renal fistula* is often formed in consequence of it. If peri-nephritis arise independently of disease of the kidney, it may be either *primary* and *simple*, or it may be *consecutive* of other maladies, especially of lesions of the parts in the vicinity and of constitutional disease, as alluded to above, and more fully in the article Abscess.

207. *D.* Renal Fistula. — *Renal fistula* may follow wounds implicating the kidneys, or their pelves or ureters; but they are more frequently the consequences of inflammation of the pelves and calices, which become distended by puriform matter, owing to obstructions to its passage to the bladder; and these obstructions are commonly caused by the impaction of one or more calculi in the pelves or ureters. The accumulated matter may find its way, by ulceration and distension, into the surrounding cellular tissue, and thence open either in the lumbar region, or near the crural arch, or in the colon or duodenum, or in the peritoneal cavity, or even in the corresponding pleural cavity or lung. These fistulæ commonly extend from the pelvis and calices into the cellular tissue upon which the posterior aspect of the kidney rests. In these cases, an extra-renal abscess, more or less extensive, forms, and proceeds in one or other of the directions just named. The most frequent and most favourable situations in which it points are the lumbar region and near the crural arch. In the other situations where a fistulous communication has been formed with the kidneys, examinations after death disclose the nature of the lesion, and, in some cases, prove the accuracy of the diagnosis which had been formed from the swelling in the region of the kidneys, and from the nature of the matters voided during the life of the patient.

208. v. Treatment of Pyelitis. — *A.* In the *early* and *acute state* of pyelitis, the chief *intention* should be to diminish local vascular action, and to alleviate the more urgent symptoms. Local *blood-letting* by cupping over the loins, or the application of leeches to the perineum and around the anus; the warm bath, or the semicupium; mucilaginous and emollient beverages; opium or other anodynes, with demulcents, &c., are the chief means by which this indication may be fulfilled. When pain is very acute, and is attended by suppression of urine, frequent vomiting, or spasmodic attacks, cupping on the loins should be decidedly employed and repeated, and be followed by the warm bath: pills, containing camphor, opium, or belladonna, may be taken: frictions or embrocations with any of the *liniments* prescribed in the *Appendix*, to which opium or the extract of belladonna has been added, may be applied to the loins or abdomen, and emollient and laxative enemata with henbane may be administered. The preparations of ether, or the spirits of nitric ether, with the compound tincture of camphor, the alkaline carbonates and anodynes, may likewise be prescribed, in mucilaginous mixtures, and in some cases with one or other of the preparations of *colchicum*. The more violent symptoms generally subside in a few hours, owing either to the change in the position of the calculus, to which they are generally owing, or to its passage into the bladder. In some cases, the calculus or calculi, or gravelly matter, is passed with the urine, and relief is obtained. In these more severe attacks or paroxysms, and after the above means have been employed without relief, *dry cupping* on the peri-

neum, or over the course of the ureter, may be tried. When a calculus is obstructing and irritating one of the ureters, as indicated by the seat of pain, and by the sympathetic phenomena, I have found this means sometimes successful. *Purgatives*, especially calomel, or calomel with opium, followed in a few hours by castor oil, or any suitable purgative draught, or by emollient and laxative enemata, are generally of service. *Emetics*, and standing with the feet on cold stones, sometimes advised in these circumstances, have appeared more injurious than beneficial; but ipecacuanha or emetic tartar conjoined with opium, and given so as to occasion more or less nausea for some considerable time, has occasionally been of service. When the acute symptoms indicating the presence of a calculus in the pelvis of the kidney, or in the ureter, have subsided, and the patient has not voided it, the urine still continuing to be charged with mucus, a catheter or sound should be passed into the bladder, in order to ascertain whether it is in this viscus or not, so that it may be removed by such medical or surgical means as may be deemed most appropriate.

209. *B.* The *second indication* is to remove chronic inflammatory action in the kidney, and to counteract the disposition to form calculi, or gradually to dissolve them by physical means suited to the morbid disposition, and to the presumed nature of the urinary deposits. — *a.* This indication is more especially appropriate to the *chronic* or *second* and *third* states of the disease (§ 177—9.). The morbid condition of the urine, in most of these cases, is owing to the states of digestion and assimilation, in connection with excess in the quantity, and with inattention to the quality and congruity of the food. The chronic inflammatory action existing in the kidneys is also thereby perpetuated, and in its turn assists in determining the seat and form of the urinary deposit. In these states of disorder, a *restricted diet*, or a diet suited to the states of constitutional power, and to the amount of exercise habitually taken; attention to the digestive, assimilative, and excreting functions; regulated exercise in the open air; occasionally small cuppings on the loins, or a seton or issue in this situation, or a recourse to terebinthinate embrocations applied on the lumbar region, and various remedies taken internally, may be prescribed.

210. In this state of disease alkalies and the alkaline carbonates in various forms of combination have been employed. But they are not suited to all cases, nor is a persistence in the use of them without inconvenience or even devoid of risk. Even in those cases for which they are most appropriate — where uric acid deposits are observed, — they may so impair the digestive functions as to increase the evil they are employed to remedy. In every case, the selection of internal remedies should be directed by the chemical state of the urine, and particularly by its *acidity* and *alkalescence*.

211. *b.* When the urinary deposit indicates the presence of the *lithic acid* calculi in the kidney, — the most frequent form of concretion, especially in gouty and plethoric persons, — cupping freely on the loins, calomel with colchicum or henbane, and brisk purgatives; alkaline and gently diuretic substances in mucilaginous mixtures; a farinaceous or milk diet, simple diluents, and regular exercise in the open air, are the most beneficial means.

212. *c.* When we infer, from the nervous and the hypochondriacal state of the patient, and from characters of the urine, that the affection of the kidneys is connected with the *oxalute of lime* concretion, depletions and evacuations are not so requisite as in the foregoing circumstances. The means which are most serviceable for removing this form of concretion are diuretic purgatives, or diuretics only; and more especially the dilute nitro-muriatic acid, with either the nitrous ether, or the hydro-chloric ether. In addition to these, sedatives, as henbane, the compound tincture of camphor, the warm bath, regulated diet, consisting of animal food and the purest farinaceous articles, attention to the digestive and excreting functions, and exercise in the open air, are generally beneficial.

213. *d.* When the affection of the kidneys is connected with the *cystic oxide* or *phosphatic concretions*, as caused by the cachectic, debilitated, or exhausted state of the constitution, and by the alkalescent condition of the urine and the composition of its deposits, a course of sarsaparilla; warm rubefacient or terebinthinate embrocations and fomentations on the loins, or setons or issues in this situation; demulcents and sedatives, and the remedies just mentioned (§ 212.), may then be employed.

214. *e.* During the *descent* of these or of other calculi, the means already advised (§ 208. *et seq.*), warm fomentations, warm diluents and sedatives; emollient enemata; nauseating doses of ipecacuanha or of antimony; the various kinds of soap, with opium, belladonna, or henbane; the infusion of *diosma* with medicines appropriate to the nature of the urinary concretion; and citrate of ammonia or nitre in demulcents, may be prescribed according to circumstances.

215. *f.* When the *chronic states* of pyelitis are characterised by a puriform state of the urine, the infusion of *diosma*, or the infusion, decoction, or extract of *uva ursi* or of *pareira*, may be prescribed, and be conjoined with anodynes when pain is complained of. If, in connection with this state, the uric acid gravel be formed, or if the urine be acid, and if the patient manifest a gouty diathesis, the alkalies or alkaline earths may be also given, or ammonia and camphor may be combined with these, and with narcotics, or, still more advantageously, with *colchicum*. The *balsamic* and *terebinthinate remedies* have been recommended in cases of chronic pyelitis with puriform urine, and are often very serviceable; and they may be exhibited in the combinations just mentioned, or consolidated to a pilular consistency by means of magnesia, when the urine is acid; but their effects should be carefully watched. As soon as the urine becomes at all *alkalescent*, or even neutral, the *nitric* or *hydrochloric acid*, or the nitro-hydro-chloric acid, conjoined with the ethers above mentioned (§ 212.), and with tonic restorative or alterative remedies, should be employed. Dr. PROUT justly remarks, that when the affection of the kidney seems to be of a scrofulous character, the same general principles of treatment as have been developed with respect to the nature of the renal concretion should be kept in view; but the tonic and restorative plan usually adopted in that form of cachexia should also be applied, as far as circumstances

will permit. For these cases, warm sea-bathing is often particularly advantageous.

216. *g*. The *diet* should be easy of digestion, and free from all stimulating condiments. When a plethoric state of the abdominal viscera, or the gouty or lithic acid diathesis prevails, a milk or farinaceous diet is often beneficial. Hard waters are generally prejudicial, and increase the pain in the loins. Yet many of the milder effervescing alkaline and chalybeate mineral waters, as the Seltzer, Pyrmont, Ems, &c., are often of service, when judiciously taken.

217. *C.* In that state of the disease characterised by accumulation of puriform matter in the pelvis and calices, so as to *occasion swelling or tumour in the loins*, the treatment is generally difficult, and the question of operation, recommended and performed by the older as well as by modern surgeons, may in some cases be entertained. As long, however, as a more or less copious discharge of puriform matter occasionally takes place in the urine, and if the tumour be partially diminished from time to time, or does not increase, whilst signs of inflammation of the adjoining viscera, or great tenderness of the tumour and surrounding parts on pressure, or hectic fever, or diarrhœa, is not observed, perfect repose, a regulated diet, a recourse to small local depletions as soon as exacerbations of inflammatory action occur, warm baths, fomentations, and the use of such medicines as have been already recommended to be taken internally, according to the prevailing diathesis and presumed nature of the obstruction or calculous concretion, are the means chiefly to be relied upon with the object of repressing exacerbations of inflammatory excitement, and of ultimately removing the interruption to the passage of the accumulated matter.

218. When, however, the renal tumour forms in a person of previously good constitution, and is painful, notwithstanding vascular depletion, mucilaginous drinks, and warm baths; if there be much symptomatic fever, with nocturnal exacerbations; if the stomach and bowels are irritable; if the tumour becomes more painful on exercise; and if suppression of urine takes place, or if inflammation extend to adjoining viscera, the propriety of having recourse to the operation of nephrotomy becomes more manifest; and still more so if fluctuation in the tumour is more superficial and extended, showing a large accumulation of pus to have formed in the cellular tissue between the kidney and lumbar muscles. The great depth of the abscess, and the slowness with which it makes its way to the external surface, as well as the risk of its opening internally, or changing its direction when left long to itself, are arguments in favour of an early recourse to the operation. It should also be recollected that those collections, particularly when they involve, by perforation of the pelvis of the kidney, or otherwise, the cellular tissue on which the organ rests, are generally fatal if they open internally, or otherwise than in the more favourable external situations, or when not aided by art. The circumstances of the case, and the progress of the tumour, will determine the surgeon whether or not the operation should be performed by incision only, or by incision and puncture, or by cauterisation and incision. M. RAYER, who is favourable to the performance of the operation under the circumstances now alluded to, assigns the following states as not admitting of having recourse to it, and surely no one could contemplate it in such cases: — 1st, When it is supposed, from the symptoms and history of the case, that both kidneys are affected, and probably contain calculi, and whilst extra-renal abscess is not yet formed — an abscess, the opening of which should not be deferred; — 2d, Whilst the puriform matter continues to pass off with the urine; whilst the renal swelling is but slight, and there appears to be no risk of the immediate perforation of the pelvis of the kidney; and whilst the kidney of the opposite side continues to discharge its duties, or performs an increased function; — 3d, Whilst serious or dangerous lesion exists in the bladder or prostate gland, or in one or more of the other viscera.

219. IV. OF VARIOUS ORGANIC LESIONS OF THE KIDNEYS. — i. *Of Hæmorrhage in or from the Kidneys.* — *Hæmorrhage*, generally to a small amount, often accompanies *inflammations* and active *congestions* of the kidney, especially the *acute form* of cachectic nephritis, and pyelitis when caused by renal *concretions*. In these cases, the blood is mixed with the urine, in the form of blood-globules, sometimes with mucus, and occasionally with both mucus and pus globules. *Renal Hæmorrhage* may take place: — 1st, from the external surface of the kidney: 2d, into some part of its substance; and, 3d, from the interior of the calices and pelvis.

220. *A. Hæmorrhage* very rarely takes place from the *external surface* of the renal capsules, unless after wounds and other injuries. Blood sometimes is effused between the surface of the organ and its fibrous capsule, most frequently owing to injury, and, in rarer instances, to great congestion of the organ, either consequent upon inflammation of the emulgent veins, or upon interrupted circulation through the right side of the heart.

221. *B. Hæmorrhage into the substance of the kidney* occurs in the form of *petechiæ* or *ecchymoses*, as in malignant and adynamic fevers, scurvy, and purpura hæmorrhagica; or of larger deposits or collections, as in cerebral apoplexy — the *renal apoplexy* of French pathologists — so as to form considerable clots. These latter are rare, and when the patient lives for some time after their occurrence, the coagula are found to have undergone similar changes to those manifested by them in other viscera.

222. *C.* When *blood exudes from the surface of the calices and pelvis*, it may either accumulate there and in the ureter, or it may pass off more or less intimately mixed with the urine. The hæmorrhage may proceed from injury, contusion, succussions of the trunk on horseback, or in a carriage, or on descending stairs; or from inflammation, congestion, or other diseases attended by obstructed return of blood by the renal veins; or from calculous pyelitis. When the hæmorrhage in this situation occurs suddenly, and in considerable quantity, the blood may coagulate either in the pelvis or in the ureter, and thus occasion more or less obstruction to the passage of urine from the kidney to the bladder; but such is not frequently the case, for the blood commonly passes along with the urine, presenting appearances varying with its quantity, with the state of constitution and of disease, with the nature of the secretions accompanying it, and with the duration of its retention in the bladder.

223. Hæmorrhage *from* the calices and pelves of the kidneys may be—1st, *Symptomatic* of diseases of these organs; especially of renal calculi, of cancer and fungus hæmatodes, and of those just enumerated (§ 220—222.); — 2d, *Constitutional* or *essential*, or dependent upon diseases characterised by depression of vital power, by weakened vital cohesion of the soft solids, and by a morbid state of the blood, as in malignant or adynamic continued and eruptive fevers, in purpura hæmorrhagica, scurvy, &c. — 3d, *Supplemental*, or caused by suppression of accustomed or of periodic discharges, and become recurrent or periodic, as when it follows suppression of the hæmorrhoidal discharge, of the catamenia, of epistaxis, &c.;—and, 4th, *Endemic*, which is rarely observed; but M. RAYER mentions it amongst the endemics of the Isle-de-France. In the second of those varieties of hæmorrhage from the kidneys, the blood is always very intimately mixed in the urine, is never coagulated, and generally imparts a dark colour to the fluid. In the others, it may be connected with fibrinous shreds in the urine, or with coagula, generally very small. The quantity of blood varies from the slightest tinge, to a very copious admixture, or large proportion of it, in the fluid voided. The blood may flow from only one, or from both kidneys: it generally is exuded from both in the 2d, or the constitutional form of the above varieties.

224. Persons subject to, or suffering renal hæmorrhage, generally complain of pain, or of a sense of weight, in one or both loins, generally increased upon firm pressure; but these feelings may be wanting in the essential or constitutional form of the disease. Occasionally the pain is acute, or is colicky, particularly when it proceeds from calculi in the kidney, or from fibrinous clots obstructing the pelvis or ureter. When it arises from vital depression and the state of the blood, the hæmorrhage may be so great as to occasion general anæmia, a result rarely occurring in other circumstances.

225. ii. *Congestion, or hyperæmia of the kidneys*, is sometimes found after death from diseases, when this state was scarcely expected to be seen. It is most frequently found in connection with diseases of the heart, particularly those attended by interrupted circulation through the right side of this organ; and when the return of blood by the renal veins is impeded by any lesion either of them or of related parts. Sometimes the engorgement is so great, that the blood gushes out when an incision is made in the kidneys. It may affect one or both kidneys, always both when the cause is constitutional, or when it depends on disease of the heart, and in diabetes. When the congestion is considerable, the kidneys present a chocolate colour, and are large or swollen.

226. iii. *Anæmia of the kidneys* also is occasionally observed after death from diseases in which this state of these organs could hardly be anticipated. It is observed chiefly in persons who have died of chronic maladies, as phthisis, cancer, chlorosis, uterine hæmorrhages, and the advanced stages of granular degeneration of the kidneys, or chronic cachectic nephritis, in connection with dropsy and scanty urine. In some cases, the kidney is so pale as to contain scarcely a drop of blood; and this state may extend to all the organ, or may affect only, or chiefly, the cortical, or the tubular structure. In other instances, the kidney is pale in patches, or natural or red in others, generally in the cortical substance. Occasionally it presents a yellow colour, which is either uniform or spotted with red or white; the whole structure of the organ being remarkably diminished in vascularity. When they are thus bloodless, they are sometimes also *soft* and *flaccid*, but they are occasionally also *firm*, and even *indurated*, and moreover *atrophied*. They are, however, more commonly *granulated*, as about to be noticed, and as described above (§ 103.). The functional derangements consequent upon this state are chiefly a serous, morbid, or defective state of the urine; dropsical effusions; and a diseased or poor condition of the blood, or deficiency of its red globules.

227. iv. *The Nutrition of the Kidneys* is sometimes much altered.—*a*. Occasionally they are much *larger* than natural, without any lesion of structure. This simple *hypertrophy* is often limited to one organ, particularly when the other is wanting, or is much smaller, or when it is destroyed by disease. Hypertrophy of one kidney has been observed where two renal arteries have been transmitted to it; and also where it received, besides its ordinary supply of nerves from the semilunar ganglion and lesser splanchnic, several branches from the second lumbar ganglion. (LAUTH.) Hypertrophy of both kidneys is often observed in cases of diabetes. They are enlarged, or rather distended, by the augmented vascularity or congestion, and the granular deposits, of the early stages of cachectic nephritis, than strictly speaking hypertrophied.

228. *b. Atrophy of the Kidneys* may be consequent upon anæmia or granular deposits, or both, or it may be independent of both. It has been observed, in connection with smallness of the renal artery, with compression of the organ by large tumours in the vicinity or attached to the uterus, with calculi stopping up the pelvis or ureter, and with cancerous disease of remote parts. In rare instances, no cause by which it could be explained has been detected. Atrophy may be either *general* or *partial*, in respect of the anatomical constituents of the organ. *General atrophy* may affect one or both kidneys: it is characterised merely by the diminution of volume, without any change of structure. It is sometimes found on dissection of cases in which no marked disturbance of the urinary functions was observed during life. *Partial atrophy* of the structure of the kidneys is found chiefly in the advanced stages of chronic cachectic nephritis (§ 87.), when the enlarged Malpighian bodies, and the granular deposits in them, have pressed upon and atrophied the vascular and tubular structures, especially the former. Partial atrophy occurs more rarely without granular deposits, and, in this case, the cortical or vascular tissue is chiefly altered, the bases of the tubular cones almost resting on the fibrous coat of the kidneys, or being separated from it only by a delicate layer of the vascular substance. In some instances, there are evident depressions between the cones, arising from the loss of the vascular structure.

229. *c. Softening* and *Induration* of the kidneys sometimes occur. The former is often accompanied with increased vascularity or congestion. This association may be considered as conclusive evidence of inflammation, particularly when any of the con-

sequent changes described above (§ 38. *et seq.*), as being met with in proper nephritis, is also observed; and is occasionally seen attending calculi in the kidneys, and various chronic alterations of the structure of the bladder, as thickening of its coats, and brownish coloration of its mucous membrane, enlargement of and puriform secretion from its follicles, &c. But softening of the kidneys may exist also independently of increased vascularity, the substance of the organ being remarkably pale, or of a peculiar grey tint. M. ANDRAL has observed this change where there had not been any sign of disease of the urinary passages.

230. *d. Induration*, like softening of the kidney, is attended either by *increased vascularity* or by *diminished vascularity* and blanching of its structure. The former state is generally accompanied with some degree of hypertrophy of the organ. When the induration is of the pale kind, it is rarely attended by enlargement, but commonly by general or partial atrophy. M. ANDRAL remarks that the pale induration presents *two* grades: in the first, the kidney is firmer than usual, but it retains its natural structure; in the second, a more advanced stage of the first, its tissue is so condensed, hard, and white, as nearly to resemble cartilage. This second grade of induration is sometimes partial, or confined to two or three of the tubular cones.

231. v. *Morbid Secretions and Formations* in the substance of the kidney are—1st, *Serum*, contained in small *simple cysts*, with serous parietes, which adhere but slightly to the surrounding tissue, is frequently met with in the cortical structure, and less frequently in the tubular. The serum is generally limpid and colourless, occasionally slightly yellowish or gelatinous. These cysts are frequently numerous, generally small, particularly in the tubular structure, but they are sometimes large in the cortical substance. They are more rarely met with in the cellular tissue surrounding the renal vessels; but they occasionally acquire a very large size in this situation, and cause proportionate wasting of the parenchyma of the organ. When the cysts are thus developed, their cavities are sometimes divided into several compartments by transverse septa. Serous cysts are found in the kidneys after death from various diseases. They are observed after the several forms of nephritis. I have seen them frequently in cases where death was caused by the more chronic diseases of the heart.

232. 2d, *Fatty matter* is sometimes found in the cortical substance of the kidney. M. ANDRAL has observed it, particularly when this substance was pale or yellow, to evidently grease the scalpel. It is connected, he thinks, with a special predisposition in the individual to the secretion of fatty matter. The existence of oil in the blood in considerable quantity, in some cases, particularly when digestion and assimilation are impaired, renders it by no means singular that the secreting structure of organs circulating so much blood through them as the kidneys should become imbued with this substance.

233. 3d, *Purulent matter* is often found in the kidneys. Abscesses sometimes form: occasionally they are very small, and the surrounding structure is scarcely altered; more rarely they are extremely large, the whole organ being converted into a purulent sac, which is generally divided into compartments. This sac may even surpass the size of the kidney so much as to produce a tumour distinguishable through the abdominal parietes. The bulk of this purulent sac is seldom less than that of the kidney, unless it be bound down by adhesions proceeding from inflammation of the adjoining portions of the peritoneum, or be surrounded by a collection of pus in the cellular structure. The septa dividing the compartments of the sac often consist of a hard, lardaceous substance. The matter thus formed in the kidney may pass off by the ureter, or it may find its way in various directions, as explained above (§ 207.).

234. In some instances the purulent matter, instead of existing in the form of a distinct abscess, is infiltrated through the substance of the kidney, giving rise to a number of whitish specks from which it may be squeezed. M. ANDRAL thinks these whitish specks have been mistaken for, and described as, tubercles. This infiltration generally co-exists with purulent formations in other organs, particularly in the veins: I have met with this purulent infiltration of the kidney in a fatal case of puerperal metritis, in which pus had formed in the sinuses of the uterus. M. ANDRAL has observed it after abscess in the right iliac fossa, and a similar case is recorded by M. GILLETTE. (*Journ. Hebdom.*, t. xi. p. 75.)

235. 4th, *Granular deposits*, and their origin have been described above. They exist in the vascular or cortical structure, and sometimes are found also in this structure where it extends between the tubular cones. They are small whitish bodies of various sizes, somewhat firm, and of a rounded form. In some cases they are few, in others they are very numerous and crowded together, filling and distending the cortical structure, and even occupying the intervals between the cones of the tubular structure. In some instances they project beyond the surface of the organ, and are distinguishable through its fibrous coat. In others they occupy chiefly the more deep-seated parts of the cortical structure.

236. 5th, The deposition of *ossific matter* has been very rarely observed in the kidneys, and then chiefly or only in the fibrous capsules of the organs, and in the arteries of aged persons. Cases are recorded by the older writers, in which portions of the substance of the kidney are said to have been ossified; but they are not detailed with any degree of precision, and cannot be relied on. The external cysts of hydatids are sometimes partially ossified.

237. 6th, *Gelatinous matter* has also been observed in the kidney by MM. ANDRAL and RAYER. This substance resembled a strong gelly of a pale colour, or a solution of starch, into which the whole cortical structure of the organ was transformed. A case occurred to me some years since in a mulatto boy, where this substance existed in one of the kidneys.

238. 7th, *Melanosis* of the kidneys is very rarely met with, and never affecting this organ alone. In the cases where the kidneys were affected by this malady, recorded by CARSWELL, FAWDINGTON, PETIT, RAYER, and CHOMEL, several other viscera were similarly diseased. (See art. MELANOSIS.)

239. 8th, *Encephaloid matter* has been found in the kidney, either in small masses, occasioning no alteration of the size or form of the organ, or in considerable tumours, or in the form of *fungus hæmatodes*, and greatly increasing its bulk. Sometimes the kidney is wholly transformed into this substance, and forms a very large tumour, which

may even be felt externally. It has been met with more frequently in young persons than in adults and those advanced in life. This matter may either form in the kidney, without appearing in any other organ, or it may coexist with similar productions in other parts. M. ANDRAL states that it sometimes seems deposited in the substance of the organ, and at other times lodged in its small vessels. It seldom is indicated during life, unless, when in connection with this disease in other parts, a tumour is detected in the region of the kidney, and a considerable quantity of blood is passed in the urine: its existence may be then suspected. Other forms of *cancerous* or *malignant disease* are very rarely found in the kidney, and then chiefly consecutively of its existence in some other part.

240. 9th, *Tubercles* are not often found in the kidneys, and when they are met with in these organs they always exist also in some other viscus, and do not differ from those of the lungs. They may be recognised by their dull white aspect, commonly with a slight greyish yellow tint, by their friability, and by their amorphous appearance under the microscope. They are either distinct or confluent. They sometimes soften, and the softened matter finds its way into the pelvis of the organ, leaving renal caverns or fistulæ. In some cases only a few tubercular germs are observed; in others, and when the degeneration is far advanced, it extends to both the cortical and tubular structures, to the calices and pelvis, and even to the external membranes and ureters. They are often disseminated through the organ in the form of small grains the size of millet seeds. When confluent or grouped, they appear as masses of considerable size, but when the mass is divided it is sure to be composed of a number of smaller tubercles. In some cases, they consist of small compact masses; being the largest tubercles, which are most disposed to soften, and to occasion further disorganisation. The tissue surrounding them may be either sound, or paler than usual, or more vascular. When they soften, the tissue around them is generally injected. In most cases, the organ is not materially increased in bulk by them; in a few it is very considerably augmented. When they form in or beneath the mucous membrane of the calices and pelvis, they are either distinct, rounded, and the size of the head of a pin, or they are grouped. In the former case, they render the surface rugous; in the latter, they produce elevated patches, of variable form and extent.

241. In sixteen cases of tubercles of the kidneys, M. RAYER found them 16 times in the cortical structure, 15 times in the tubular, 13 times in the mucous membrane of the calices, pelvis, and ureters, and twice in the capsules of the organ. He has seen this lesion twice in new-born infants, and considers it rare in aged persons. Of 16 cases, both kidneys were affected in 6; and of the 10 cases of affection of a single organ, the left was 7 times the seat of the disease.

242. The *symptoms* of this change are seldom such as to indicate its existence. It is only when the tubercles soften and open into the pelvis of the organ, that the existence of the disease may be suspected, and then chiefly from the appearance of the matters contained in the urine. The tubercular matter passing with the urine into the bladder generally excites inflammatory action in the mucous surface of this viscus, and the patient's sufferings are usually referred to it, and the original seat of disease thereby masked.

243. 10th, *Hydatids*, or *acephalocystis* (the *Acephalocystis socialis vel prolifera*), are rarely found in the kidneys of men. They are generally numerous or multiplied, and contained in a *mother cyst*, which frequently acquires a large size, forming a tumour which may often be felt externally. They present the same appearance in this organ as described in the article HYDATIDS. The hydatidic cyst is developed in the substance of the organ, and, as it acquires a large size, it generally forms adhesions to the parietes of the calices or pelvis, and opens into the renal cavity by one or more openings, through which the smaller of the hydatids, and the *débris* of the larger, with the serum which they contained, escape with the urine. The expulsion of the hydatids commonly occasions pain in the region of the kidney, and sometimes retention of urine or diminution of it, owing to obstruction of the pelvis or ureter by one or more of them. These retentions, occasional, or repeated, or more or less continued, may ultimately cause dilatation of the ureters and of the pelvis, and various changes in the structures of the organ. The symptoms of hydatids in the kidneys are very equivocal. They frequently occasion but little disturbance until the mother cyst acquires a large size. It is chiefly by their presence, or by their *débris* in the urine, that we can form a correct opinion as to their existence. In one case I thus recognised them: but the patient passed from my observation.

244. 11th, *Worms* are very rarely found in the kidneys. The *Strongylus gigas*, the *Dactylius aculeatus*, and the *Spiroptera hominis*, are the only worms found in this viscus. Their exact situation has not been fully determined. It is probable that they exist only in the pelvis of the organ, although they have been described in general terms as found in the kidneys. M. RAYER has adduced many of the cases of this description on record, and, amongst others, those published by Messrs. LAWRENCE, BURNETT, and CURLING, and to which reference is made in the *Bibliography* to this article.

245. V. MORBID CHANGES IN THE CALICES AND PELVIS, AND IN THE URETERS. The mucous membrane, or rather the submucous tissue of these parts, is often simply congested without any other lesion: and this has sometimes been the only alteration discoverable when the patient has been passing bloody urine, with pain in the region of the kidneys and course of the ureters. In some cases, minute ecchymosis may be observed, in addition to congestion of these parts. This membrane sometimes appears thickened, either in parts or throughout its whole extent, producing temporary, or even permanent obliteration of the ureters. *Vegetations* from this membrane, of a red, soft, fungous appearance, with a broad base, and varying from the size of a pea to that of a small walnut, have also been found in the pelvis of the kidney. M. LOUIS met with a case of great thickening of the walls of the *calices*, *pelvis*, and *ureters*, with increased capacity, the kidneys themselves being reduced to half their ordinary dimensions. The mucous membrane in this situation, as in other parts, often secretes pus, and more frequently without being ulcerated than when this lesion has taken place. M. ANDRAL has seen it covered by a false membrane resembling

that of croup. The submucous tissue of the pelvis and ureters has been, as noticed above (§ 240.), filled with a layer of tuberculous matter; but in such cases this matter has existed also in the substance of the kidneys as well as in the lungs.

246. *Dilatation* of the calices, pelvis, and ureters, sometimes to a remarkable extent, frequently takes place when any obstacle exists to the free passage of the urine into the bladder. The ureters are often greatly dilated in various chronic affections of the uterus, particularly when tumours form in the uterus and press upon the bladder, diminishing its cavity, or obstructing the outlets of the ureters. When the obstacle to the passage of urine along the ureter is situated near the kidney, the portion of this duct below it frequently contracts, and becomes even obliterated. *Ulceration* and *perforation* of the pelvis or ureter sometimes occur, occasioning extra-renal abcess and urinary fistula, as shown above (§ 187.).

247. VI. ALTERATIONS OF THE BLOOD-VESSELS OF THE KIDNEYS.—*A.* The *renal arteries* have been found variously diseased, in rare cases only. Aneurism of the emulgent artery has been recorded in only two or three cases, — by D. NEBELLI (*Ephem. Nat. Curios.*, cent. ix. ob. 59. p. 142.), L. ROUPPE (*Nova Acta Phys. Med.*, t. iv. p. 67. 1770), and M. DOURLIN (*Journ. de Chirurg. et de Méd.*, t. vii. ann. xii. p. 252.). I saw a preparation at the Medical Society of London, many years ago, which appeared to indicate a small aneurism of the emulgent artery. *Cartilaginous* and *ossific deposits* have been found in the renal arteries of very old persons.

248. *B. Inflammation of the emulgent veins* sometimes occurs, generally in connection with some form or other of nephritis. In most of these cases the canal of the vein has been nearly filled with fibrinous or albuminous concretions. M. RAYER observes that he has seen, in several cases of albuminous nephritis, — the cachectic nephritis of the author, — the renal veins filled with fibrinous concretions, and the coats of the vessel thickened. Not only may inflammation of the renal veins be connected with nephritis or structural lesions of the kidneys, but it may be connected in other cases with inflammation of the vena cava or of the ovarian vein. I have seen several cases in which inflammation of the emulgent vein accompanied inflammation of the uterine and ovarian veins in the puerperal state. Similar instances have been observed by Dr. R. LEE, M. DUGÉS, and others.

249. VII. AFFECTIONS OF THE NERVES OF THE KIDNEYS have been noticed by writers, but lesions of the structure of these nerves have not been observed, nor, indeed, can such lesions, although existing to some extent, readily admit of detection. Painful affections, referred to the nerves of the kidney under the term of *Nephralgia*, are generally owing to the irritation of calculi, either in the kidneys or about to pass from the pelvis into the ureter; and is only a different name for what has been called *nephritic colic*, caused by renal calculi. *Nephralgia* may attend calculous pyelitis, as noticed above (§ 184.), or may be merely that grade or state of irritation which occasions a manifestation of morbid sensation in the renal nerves, without inducing, or being attended by, inflammation — the sensible expression of irritation produced by a mechanical cause. *Nephralgia* is sometimes complained of in nervous or hysterical females, and is manifestly owing in them to irritation or excitement of the nerves of the uterus and ovaria, propagated thence to the nerves of the kidneys, in consequence of the intimate connection of the sexual and renal nerves (*see Art.* IRRITATION). That the sensibility of the renal nerves should be morbidly excited in many cases of hysteria is not surprising, when we consider the exaltation of function — the copious secretion of urine — which generally attends uterine excitement and hysteria.

250. *The Treatment of Nephralgia* will entirely depend upon its pathological relations. If it proceeds from calculous irritation, much of what has been advised for pyelitis depending upon this cause, and combining these with narcotic and external derivatives and rubefacients — with the diosma, camphor, henbane, opiates, alkalies, fomentations, warm baths, &c., — may be prescribed. If the nephralgia be *hysterical*, or be connected with uterine irritation, the treatment advised for the other affections of this nature (see HYSTERICAL AFFECTIONS, § 22.) will generally remove it, and attention to the means there recommended, with the view of restoring nervous tone (§ 84.), will prevent the recurrence of this affection.

251. VIII. ABSENCE OF THE KIDNEYS has been noticed by several pathologists. The entire *absence of both kidneys* has been observed in the fœtus by ODHELIUS, BUTTNER, EVERHARD, GILIBERT, HEUERMANN, MAYER, and others. BECLARD remarks that the kidneys are often wanting in acephalous fœtuses, but that one or both exist when the whole or greater part of the spinal chord is present. *Absence of one kidney* has been met with on several occasions. Generally the existing kidney is much larger than usual, and sometimes double its ordinary weight; and it may be either placed naturally, or somewhat too high or too low. In two cases of this description which occurred to M. ANDRAL, one presented the supra-renal capsule of the side on which the kidney was altogether wanting fully developed, proving that the existence of the former does not depend upon that of the latter. The other case was important, inasmuch as the single kidney was in a state of disease, being studded with whitish granulations. The patient was dropsical, evidently from this state of the kidneys, the other internal viscera being sound. Sometimes when one kidney is supposed to be wanting, the other, instead of being in its natural situation, is placed in front of the vertebræ. M. ANDRAL states, that in every case of this description which he had examined, the kidney was only apparently single, being composed of the two united and confounded together at the median line. There may, apparently, be but one kidney, from the circumstance of the other being situated in the hypogastrium beside the bladder. ANDRAL met with a case of this description.

252. IX. THE SITUATION OF THE KIDNEYS may be unnatural, or uncommon. In a few instances they have been found united and placid, in the form of a horse-shoe, *across the spinal column*. Numerous references to cases of this description have been adduced by PLOUCQUET and RAYER. One or both kidneys may be placed much *lower* than usual, and, in very rare instances, they may occupy the pelvis, or its brim: but only one of these organs has been found so low as to occupy the pelvis. Cases of this unnatural position of

one kidney have been referred to by the writers just named. Where this occurs in the female, the uterus is generally more or less displaced by the kidney; and, if the female thus circumstanced becomes pregnant, serious consequences may accrue. Instances of this kind have been recorded by M. Boinet (*Arch. Gen. de Med.*, t. vii. 1835, p. 348.), Dr. Hohl (*Bullet. de* M. Furrusac, t. xvii. p. 3.), and Dr. Heusinger (*Ibid.*, t. xv. p. 131.).

253. One or both kidneys—one especially—may be *displaced* by the pressure of an enlarged viscus, or by a tumour, abscess, or other cause. The displacement may be even so great as to constitute a hernia of the organ, as in the cases recorded by Haller, Monro, and Portal. One or both kidneys may also be more or less *moveable*, owing to the state of the tissues surrounding and connected with them, and to structural lesions of their substance—especially calculi and abscesses. Generally, however, lesions of the organ itself are but little concerned in giving rise to its *mobility*, either in a vertical or horizontal direction, although insisted upon by Riolan. Instances of this lesion have been noticed by Velpeau, Gerdy, and Rayer; and several of them are detailed by the last-named writer.

254. The *symptoms* in these cases consisted chiefly of pains in the abdomen or loins and corresponding thigh; of hypochondriacal and colicky affections; of weakness or neuralgic pains of the limb, and sometimes of œdema of the thigh, or a moveable tumour detected in the abdomen. Most of the instances on record occurred in females; and the right kidney was almost exclusvely thus affected. They appeared to arise from enlargement of the liver, distension of the cæcum, frequent pregnancies, muscular efforts, &c.; and, in some of them, peculiar dispositions of the peritoneum and of the blood-vessels of the organ were remarked. M. Rayer alludes to two physicians whose right kidneys were thus moveable.

255. In cases of this description the patient should wear a suitable belt or support, as being the principal means of preventing, as well as of removing, the pains and other symptoms caused by this lesion. In some instances, the cold or tepid douche on the loins, and the horizontal position, may be advantageously recommended.

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LACTATION.—*Lactatus, Lactatio.* *Γαλουχια.* *Lactation, allaitement*, Fr. *Säugung*, Germ. *Allatamento*, Ital. (*Suckling*).

Classif.—General Pathology.—Special Pathology.—III. Class, I. Order (*Author.*)

1. Defin.—*The function of secreting and excreting milk.*

2. It is justly observed by Dr. Locock, that lactation in the human female, when naturally conducted, cannot be called a disease; but even under the most favourable aspect there are often circumstances which require attention and regulation, for the purposes both of alleviating pain and of preventing mischief. There are, also, frequent interruptions to this usually healthy process, and so many important questions connected with it, at various periods, that it becomes necessary to notice them, although briefly.

3. The intimate sympathy between the mammæ and the uterus is evident even in the unimpregnated state. This is observed in connection with menstruation, and in some diseases of the womb. In pregnancy the alteration in the breasts is well-marked, and the quantity of milky serum secreted is sometimes very great, particularly towards the close of utero-gestation. Many women, however, have no appearance of milk before delivery, and yet have an abundance afterwards.

4. I. Slighter Disorders of Lactation.—*a.* After parturition, the infant is usually applied to the breast, as soon as the exhaustion more immediately consequent upon this process is partially removed, or generally within the first twenty-four hours, in order to draw out and form the nipple, before the breasts become hard or distended, and to encourage the flow of milk. There is seldom any quantity of milk secreted, with first children, before the third day; but about that day, or one or two later, the breasts become swollen and hard, and often hot and painful; the pulse is accelerated; and slight chills, febrile commotion, thirst, disturbed sleep, and occasionally slight disturbance of the sensorium, supervene. This constitutional excitement attending the establishment of the function of lactation continues until the milk is at its height, as it is termed: the breasts are then extremely hard, knotted, loaded, and tender. The swelling may extend to the clavicles and axilla, the glands in this latter situation being also enlarged; but a small quantity of milk will ooze out from the nipples, especially if the breasts be fomented or gently pressed. The act of suckling the infant is attended by great pain in the breast, but it is followed by relief; and as the milk flows, the hardness and swelling are diminished. After some hours, if the milk be freely drawn off, the sensations become more comfortable, and the process of lactation is duly established.

5. *b.* The above state of local and general disturbance ushering in this process may vary in grade from that described; but, when it is at all considerable, means should be used to alleviate it. As soon as the febrile symptoms begin, a cooling saline purgative should be given, and repeated in twelve or twenty-four hours, according to circumstances. In order to allay thirst, and to prevent the distension of the breasts which copious draughts would occasion, cooling saline diaphoretics, or effervescing draughts, ought to be prescribed. When the infant cannot draw out the nipple of a hard or distended breast, or obtain the thick milk distending the ducts, an older child may be applied, or a grown person should do this, or have recourse to artificial means, such as the breast-pump, &c. Natural or artificial suction, fomenting the breasts with hot water, warm poultices, &c., generally relieve the local disorder, and promote a free discharge of milk.

6. *c.* The milk first drawn contains a considerable quantity of what has been called *colostrum*, and has a purgative quality, thus serving to evacuate the meconium which loads the large intestines. When, therefore, the infant does not get the first draught of the breast, from being suckled by a wet-nurse, or from being brought up by hand, a gentle purgative should be given to it; as diarrhœa or convulsions may arise from the retained meconium. In other circumstances, the exhibition of a purgative may be superfluous; for, as Dr. R. Lee has shown, a quantity of highly nutritious albumen is found in the small intestines above the situation of the excrementitial meconium, serving for the sustenance of the infant until lactation is fully established. A purgative, therefore, given before this process is fully commenced will carry off this substance.

7. *d.* The milk varies much in its properties, and even in its sensible qualities and appearance, during the usual period of lactation, according to the diet, modes of living, state of mind, and bodily health of the nurse. At first the milk is thick, yellowish, and abounds with cream: but, after a few days, it assumes the usual appearance, and becomes thin, bluish, and sweet. The taste and qualities of the milk are altered by several articles of diet, by repletion, hot and close rooms, by medicines, and moral emotions, particularly those of a violent kind; and the infant is more or less affected by the alteration. The milk may be so disordered as to have a saline, a bitter, or an otherwise unpleasant taste, the infant relinquishing the breast instantly upon tasting it. So remarkable an influence may medicines have upon the milk, and through it upon the child, that a purgative taken by the nurse may affect the former, without materially affecting the latter. Alkalies, mercury, various alteratives, and saline substances, often act in a similar way. The colour of milk may be changed somewhat, owing to an admixture of a little blood with it from the exterior or interior of the nipple. It is not infrequently altered by biliary disorders of the nurse. Dr. Locock has seen four instances where it was of a golden yellow hue, and where, upon standing, a thick layer of bitter cream, as yellow as pure bile, floated on its surface. In neither of these cases

was the nurse jaundiced; but, a very copious flow of bile being procured from the intestines by mercurial purges, the yellowness gradually disappeared; the child till then having been much griped and affected with diarrhœa. Yet in no cases where the wet-nurses have been jaundiced has Dr. LOCOCK seen the milk yellow; and it is not uncommon for them to become thus disordered, owing to a sudden transition from a scanty diet, to a full and luxurious mode of living. Milk may disorder the infant from merely being too rich. The remedy in this case is to purge the nurse, to cause her to take active exercise, and to abridge her diet.

8. *e.* The properties of the milk are altered more or less by *menstruation* and *pregnancy.* Menstruation generally impairs both the quality and the duration of the milk. The infant often brings up the milk, becomes fretful and disordered in the bowels, the stools being watery, frequent, or of a spinach-colour. When this form of disorder occurs, menstruation in the nurse should be suspected. The *pregnancy* of the nurse may not only cause the milk to be scanty, watery, &c., but may also variously disorder the infant. It is supposed by many that suckling will prevent impregnation; and, owing to this notion, lactation is often continued for much too long a period, as respects the health both of the infant and of the nurse; but women very frequently do become pregnant when suckling, whilst some do not. Mr. ROBERTON found that, in 160 cases, 81 had become pregnant once or oftener during this process. Dr. LOCOCK is decidedly of opinion that those women who menstruate during lactation will more readily conceive than those who do not; and he has also remarked, as Dr. HAMILTON has done, that both these occurrences are more common with first children: hence women under these circumstances are not, *cæteris paribus,* so eligible as others for wet-nurses.

9. II. MILK FEVER.—*a.* This disorder is a morbidly aggravated form of the local and general excitement attending the commencement of lactation, and noticed above (§ 4.). The febrile symptoms are much more severe than in it, and are ushered in by chills or a marked rigor. There are severe pains and throbbing in the head, flushed face, intolerance of light and sound; excessive thirst, a hot and dry skin; a rapid, full or hard pulse, furred or loaded tongue, costive bowels, scanty or high-coloured urine, and sometimes a diminution of the lochia.

10. These attacks are commonly *caused* by a stimulating diet, a heated or close apartment; by over-exertion, disturbance, or mental agitation; and exciting beverages. They were frequent occurrences, when brandy caudle, large fires, imperfect ventilation, and loads of bed-clothes, were generally adopted; and were often followed by inflammatory fevers, phrenitis, &c.

11. *b.* The *treatment* of this disorder is very manifest: cooling saline purgatives, cooling diaphoretics, due ventilation, and a moderate temperature of the apartment; the encouraging of a copious flow of milk, and the avoiding of mental emotions and excitement of the senses, are the most influential means of cure: and generally produce a remission of the symptoms in the course of a few hours, and a copious perspiration. If, however, injudicious means be employed, and either the milk or the lochia, or both, be suppressed, very dangerous disease will supervene, and copious depletions will be requisite, with other remedies appropriate to the nature of the consequent mischief.

12. III. EXCESSIVE SECRETION OF MILK. — *a.* The secretion of milk may be excessive in *reality,* or only *apparently.* The former exists when the quantity secreted and excreted is inordinate, the breasts being distended, painful and knotted, although the discharge from them is free or even very copious: the latter obtains chiefly where there is deficient power of retaining the milk, a constant discharge taking place in the intervals between suckling. In most, however, of such cases, the quantity secreted is really augmented. In connection with this excessive secretion, there is generally more or less constitutional disorder; for, as in the first instance, if the breasts be much swollen and painful, a species of chronic milk fever may attend this excessive function: and, ultimately in such cases, as well as in those characterised by deficient powers of retaining the milk, the frame of the nurse is exhausted by the inordinate discharge, and by the diversion of the nourishment from herself. In such circumstances, similar disorders to those observed in females who have suckled too long, or in those who are constitutionally, or from previous health, incapable of suckling at all, soon manifest themselves, and the nurse sinks into a state of marasmus, or of hectic or of chronic debility, or becomes consumptive, or complains of dragging pains and weakness in the back or loins, &c., or presents the state occasioned by prolonged lactation about to be noticed.

13. *b.* The *treatment* in these states of disordered lactation should depend much upon the form which it assumes, and the effects it has produced on the general health. In the *first form* (§ 12.), or when the secretion is very excessive, the breasts being swollen, hard, and tender, and the health not materially impaired, cooling diaphoretics, saline aperients, refringents, low or moderate diet, and avoiding sexual indulgence, are the most appropriate means. In the *second form* (§ 12.), or when there is an insufficient power of retention, it has been proposed to have recourse to topical astringents, as lotions of alum, zinc, &c.; but these are apt entirely to suppress the secretion of milk. Others again have advised the internal use of astringent tonics and the mineral acids; but these remedies frequently disorder the bowels of the infant. The preparations of steel, or of cinchona, or other vegetable tonics, the shower-bath, or cold salt-water bathing, and a cool state of the breasts, are the most beneficial remedies.

14. IV. UNDUE LACTATION.—Lactation may be undue or improper as respects — 1st, The state of the nurse's constitution or existing state of health; and, 2d, The lengthened continuance of it. — Females of a nervous susceptible temperament, and weakened constitution; those who are predisposed to pulmonary consumption, to puerperal mania, or to insanity in any form; and those who have been chlorotic and very hysterical before marriage, frequently are incapable of suckling for any considerable time, without exhibiting indications of its injurious effects upon their constitutions, and even upon the infant also. These effects are usually the same as those which follow a too protracted period of lactation.

15. *a.* The *duration* of suckling should have strict reference to the health of the nurse and the state of the infant. Many begin, and continue to suckle for some time, with great success; but, owing to disturbed rest, insufficient food, and too frequent or too prolonged applications of the infant to the breast, the health of both nurse and infant ultimately suffers. Where lactation is judiciously regulated, and the health of the nurse is not impaired thereby — whilst strength and nourishment are preserved by a suitable quantity of food and drink, and rest is not prevented by too frequent applications to the breast, — the period may be protracted without injury to either the nurse or infant. But if the nurse menstruates, or becomes pregnant, the period should be terminated forthwith, such provision being made for the nourishment of the infant as its age, state of health, and its progress in the process of teething, will warrant.

16. *b.* The *symptoms* of undue lactation are such as naturally result from a protracted discharge or drain, beyond the assimilating powers and strength of the nurse. When the infant is at the breast, or a short time after its application, she feels a sense of dragging in the back or loins, and of sinking at the sternum and pit of the stomach, with a feeling of emptiness, which continues for some time. After these have been felt for a time, the appetite fails gradually; general lassitude is complained of; the pulse becomes quick and feeble; alternate chills and flushes of heat come on; and the spirits sink, or are irritable or weak. Subsequently emaciation, costiveness, head-ache, weakness of sight, loss of memory, thirst, dry tongue at night, and night perspirations, supervene; and in some cases pulmonary consumption, in others symptoms closely simulating consumption, or a chlorotic or anæmic appearance of the surface, leucorrhœa, neuralgic pains in various situations, or pleurodynia, and not infrequently that form of puerperal mania which I have described (see Insanity, § 534.) as occasionally following undue lactation, are thus caused.

17. *c.* The *treatment* should consist of the immediate removal of the cause of the disorder. The infant should be weaned, and those disorders, if they have not made too great a progress, or gone on to organic lesion, will generally disappear before appropriate remedies. But unless lactation be terminated, such remedies will often fail of being serviceable. This having been done, or being in progress, vegetable tonics, the compound steel mixture or the acetate or other preparations of iron, cold or sea-bathing, the shower-bath, change of air, and light nourishing food, in conjunction with such other means as the form of disorder thus caused will suggest, will generally restore the patient to health.

18. V. Suppression of the Milk.—The milk may be suppressed, or suddenly disappear from the breasts, at any period of lactation, but more readily very soon after delivery. The suppression may be *total*, or only *partial;* and it may be *primary*, or *consecutive*.—*a.* It may be considered as *primary* when milk does not appear at all in the breasts after delivery, and *consecutive* when a *total* or *partial* suppression follows the establishment of the process of lactation. The *non-appearance* of milk in the breasts is generally owing to some fault in the organization, or in the nervous energy of these glands; to want of constitutional power, or of necessary nourishment; to excessive discharges, whether hæmorrhagic, lochial, or leucorrhœal; to the occurrence of acute or inflammatory diseases; to the pre-existence of organic maladies; to mental distress and anxiety; to cold applications and astringents to the breast; and to various circumstances peculiar to individual cases. Frequently, instead of a total suppression, or *non-appearance* of milk in the breasts, there is merely an *insufficient secretion* — the quantity being much below that which is requisite to the health and growth of the infant.

19. *b.* The *consecutive suppression* of milk is generally owing to fear, sudden terror or fright, anxiety of mind, unpleasant news suddenly or unexpectedly communicated, grief, all the depressing passions and emotions, startling noises, disappointment, vexation, anger, &c. It may be occasioned also by severe attacks of disease, or by any of the causes enumerated above (§ 18.). Whilst the suppression of the lacteal secretion may proceed from the developement of inflammatory or other acute diseases, these latter may also arise from the suppression of milk caused by mental emotion, or by other occurrences. In the former case, it may be considered that the inflammation or sanguineous afflux, constituting these diseases, creates a diversion of the vital current from that quarter where it is necessary for the continuance of the lacteal secretion: in the latter case, either the passage of the milk from the breast into the mass of blood, or the accumulation in it of the constituents requisite to the formation of this fluid, creates such a state of vascular plethora, or affects the blood in such a manner as readily to kindle inflammation, or cause congestion, effusion of serum, or other changes in organs disposed to such maladies either by original conformation or by an acquired predisposition. Dr. Locock states — and even more remarkable facts of a similar kind have been recorded by numerous writers of high character — that he has observed, when bleeding has been had recourse to in inflammatory diseases, with sudden suppression of milk, that the serum of the blood, when separated by rest, has been white, opaque, and bearing nearly all the characters of milk, excepting the formation of cream on its surface. It may also be observed, that, when the milk has been driven back by active purgatives, a large quantity of milk-like fluid may be seen in the motions. However, a milky state of the serum of the blood often attends the puerperal states, independently of any suppression of milk; and I have seen, in several cases, some years ago, in Queen Charlotte's Lying-in Hospital, the serum effused in the peritoneal cavity, in fatal cases of complicated puerperal fever, present a milk-like appearance, with clots like the curds of milk; and yet the secretion of milk was not suppressed during the disease. The same appearances have also been observed in cases where a suppression of the milk had occurred.

20. In rare instances, when the milk is suppressed, a vicarious discharge of it, or of a fluid very closely resembling it, takes place from various situations: this has been termed a *translation* of the milk, and in many of such instances the general health has not materially suffered. The situations where this vicarious discharge has occurred are, the mucous surface of the intestines;

of the womb or vagina, in the form of leucorrhœa; the fauces and throat, the kidneys, &c.

21. *c.* The *treatment*, in cases of the non-appearance or of the suppression of the milk must depend upon the *causes* producing it, the *extent* to which it has been carried, and upon the *effects* it has occasioned. When it is desirable to restore the secretion, the infant should be kept to the breast, or the breasts ought to be regularly drawn; and, if the suppression be partial, or owing to insufficient nourishment, the removal of this cause will generally be sufficient to restore the secretion. Some females have an insufficient, and watery, or thin supply of milk, owing to the use of too much fluid, as weak tea, &c., and to a poor vegetable or watery diet, and living in low damp situations and dwellings. A due supply of light animal food, of richer beverages, and living in a dry pure air, will restore to these the healthy secretion of milk. If inflammatory or other diseases have resulted from the non-appearance or suppression of the milk, the treatment will necessarily depend upon the nature and character of such disease; keeping, however, in recollection, this particular circumstance connected with their production.

22. There are two facts connected with the non-appearance or suppression of the milk which should not be overlooked. Some women dissemble, and wish to make it appear that they have no milk, or an insufficiency of milk, in order that they may avoid suckling. A few of these may have a fear of its effects upon their own health; but much more frequently they dissemble with a view of avoiding the trouble and confinement connected with suckling, and of preserving the form of their breasts. Hired nurses, on the other hand, often pretend that their milk is abundant and healthy, when it is neither the one nor the other; or even when it is nearly gone. When the milk is gone, and when, in most instances, it cannot be restored, it will be found that the breasts do not swell nor become firm after a considerable time from the last period at which the infant was applied to them. The infant seems hungry, even upon quitting the breast; and is constantly seeking to be applied, but quits the nipple, after having taken it for a very short time, with impatience and with distressing cries. It passes very little urine, it sleeps little, and is rapidly emaciated.

23. VI. The Termination of the Period of Lactation becomes necessary when the infant is sufficiently old to be fed by many of the usual articles of diet, when it is from eight or nine to fifteen months old, and when it has four or six teeth, or more. But there are other circumstances which indicate the propriety of terminating the period of lactation, before it be prolonged to the term now named, and to which attention is more especially directed above (§ 16.). Where these exist, or when the child is dead, the secretion of milk should be gradually suppressed. A sudden suppression of this function might endanger the occurrence of phrenitis, of fever, or of internal inflammations. The safest means of accomplishing this end, are the exhibition of saline purgatives, and of refrigerants, a low and cooling diet, and a sparing use of fluids. If the breasts become hard or painful, a small quantity of milk may be drawn off, and stimulating liniments may be applied to them. They should also be rubbed gently with warm oil. After a few days, but little inconvenience will be felt, and in a few more, the milk will have entirely disappeared.

24. *In weaning* an infant, however, the gradual withdrawal of it from the breast, and the partial feeding it for some time previously to complete weaning, generally favours the dispersion or suppression of the milk, and prevents much disorder or inconvenience being felt from the cessation of this function. Still the bowels ought to be kept very freely open, and purgatives should be given from time to time, or according to circumstances, otherwise loss of health, depression of spirits, disorder of the digestive organs, or some specific disease, to which a predisposition may exist, may supervene. (*See also, connected with this subject, the article* Mamma.)

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LARYNX AND TRACHEA. — Synon. Λαρυγξ, *Larynx*. *Luftröhrenkopf*, Germ. *Larynx*, Fr. *Laringe*, Ital. — *Trachea*. *Die Luftröhre*, Germ. *Trachée*, Fr. *Trachea*, Ital. *Windpipe*.

1. I comprise under this head those affections which more especially interest the functions and organization of the *larynx, epiglottis, and trachea*. Those disorders which are *sympathetic, nervous,* or *functional*, are *first* considered; and those diseases which are *inflammatory*, and are *consequent upon inflammation*, are *next* discussed. The *physiology* and *connections* of this part of the respiratory apparatus should be constantly kept in view when we discuss the causes, symptoms, nature, and treatment of its diseases. The circumstances of its being the portal through which air passes into and out of the lungs, and the chief part of the organ of voice or of human sounds, during the passage of this fluid from the lungs; the exquisite sensibility with which it is endowed rendering it capable of preventing injurious matters of every grade of fluidity or consistency from entering into an organ which more immediately than any other interests the life of the individual; its intimate connection with the parts concerned in the process of deglutition, and the protection it receives from the epiglottis, cannot fail of suggesting important considerations respecting the relations, consequences, and treatment of its disorders.

2. I. Nervous, Functional, or Sympathetic Affections of the Larynx. — As the exact extent of function of the larynx has not been fully understood until recently, so the nature and con-

nections of the disorders of this organ have been very imperfectly known, and several of these disorders have been confounded with one another, or been referred to pathological conditions from which they are altogether distinct and alien. Several of the sympathetic affections of the larynx hardly differ from each other in their phenomena, particularly as regards the disorder of the function of respiration, and yet they proceed from very different or even opposite pathological states: and some of these states do not admit of recognition during life. Others, again, may be distinguished from one another, as respects both their individual characters and their morbid relations. It becomes, therefore, a work of interest, but of no small labour, to point out those distinctions which actually exist between some, as well as the relations that subsist between others of these affections; and the difficulty of doing this is much increased by the circumstance of the same names having been applied by several writers to very different morbid conditions; and, in some instances, from one name having been made to comprise more than one distinct form of disorder. This confusion has arisen from writers having described these disorders partly from the recollection of a few ill-observed phenomena, and partly from imperfect descriptions contained in books. Thus the affection which was correctly denominated "*Spasmodic Croup*" by Wichmann, Michaelis, and Double, and the "*Acute Asthma of Infants*," by Simpson and Millar, and which I have described as a species of croup characterised by predominance of spasmodic or nervous symptoms, in connection with signs of inflammatory or catarrhal irritation in the respiratory passages, has been confounded with the *stridulous respiration with laryngic suffocation*, which arises from a variety of pathological states, which is entirely unconnected with any affection of the respiratory passages, and which is very distinct from true *spasmodic croup*, which is always attended by signs of inflammatory, bronchial, or catarrhal irritation, as shown in the article Croup (§ 14. *et seq.*). Again, to the affection which is characterised by stridulous respiration with laryngic suffocation, and which is aptly enough termed "*Laryngismus stridulus*," Dr. Good applies, with practical ignorance of the disorder, the description truly belonging to the *spasmodic croup* of Wichmann, &c., or the *acute asthma of infants* of Millar; thinking that this affection is identical with that noticed by Clarke, Cheyne, Ley, Marsh, and others. These distinct disorders have been confounded together by other writers also, and more recently by Dr. Joy.—I proceed to consider *stridulous inspiration*, or *stridulous laryngic suffocation, of children*. The affection most nearly resembling it, in this class of patients, is that to which I have now referred, and which I have described as a species of *croup with predominance of spasmodic or nervous symptoms (see art.* Croup, § 14. *et seq.*); both these distinct affections having come frequently under my care, especially during the fifteen years that I was physician to the Infirmary for Children, both in that institution and in private practice.

i. Stridulous Laryngic Suffocation in Children. — Synon.— *Spasm of the Larynx; Spasm of the Glottis*, Marsh. *Laryngismus stridulus*, Good. *Crowing Disease of Infants; Cerebral Croup; Spasme de la Glotte et du Thorax*, Gardien. *Pseudo-Croup nerveux*, Guersent. *Asthma thymicum*, Kopp and Frank.

Classif.—II. Class; III. Order (*Author in Preface*).

3. Defin.—*Crowing inspiration, with a sense of suffocation in the larynx, and a tumid and purple countenance, commencing suddenly and after irregular intervals; the attacks being of very short duration, ceasing also suddenly, and not attended by cough, or other sign of irritation seated in the larynx itself.*

4. *A. Symptoms.*—The earliest accounts of this disease, distinct from the affections with which it was and still is confounded, have been furnished by Drs. John Clarke, Monro, Gölis, and Cheyne, who have described it nearly in the following terms: — The child is suddenly seized with a spasmodic inspiration, consisting of distinct attempts to fill the lungs, attended by a shrill noise: the eyes are staring, and the child is evidently in great distress, and seems threatened with suffocation. The face and extremities, if the paroxysm continues many seconds, become purple; the head is thrown back, and the spine bent: at length a strong inspiration takes place, a fit of crying generally succeeds, and the patient falls asleep. The paroxysm may occur often in the course of the day; but it is most apt to take place on first awaking, or on exposure to causes of irritation, or when vexed, about to cry, or startled by any cause.

5. This affection may continue to recur for some months, if neglected, until, at last, the extremities are also affected by spasm, or convulsions become general. When it appears upon waking from or during sleep, or upon rudely waking the child, there are a state of alarm and agitation, a struggle for breath, with crowing or shrill inspiration, which cease after the lapse of a few seconds. The attack may return after various intervals: at the commencement the child often continues many days, or even some weeks, exempt from them; but, if the morbid state on which they depend be not removed, they generally return more frequently, and at any period in the day or night, and are brought on by the most trivial circumstances, especially by surprise, fright, or any mental irritation or excitement. At last the child may be carried off by an attack, and with the usual signs of asphyxia.

6. In some cases, this affection of the glottis goes on, unassociated with spasm of any other part, beyond the attempts to inspire, which are generally powerful and convulsive. But in severe or neglected cases, and, in some instances, from the very commencement, the muscles of the arms and legs are affected; the thumbs are drawn firmly in upon the palms of the hands; the toes are bent downwards, and the wrists and ankle-joints are inclined inwards, forming what has been named "*carpo-pedal contractions*." The progress of the disease is not uniform: occasionally the attacks become less severe, less frequent, and less complicated, and again resume their former frequency and severity. They may be fatal in the simple laryngeal forms: or they may not prove so until they are attended by the carpo-pedal contractions, or pass into more general convulsions. I may, however, mention, that not only is the laryngeal affection sometimes simple, and unattended by

the carpo-pedal contractions, but that these contractions may be the only form of spasm, and may entirely disappear with the morbid condition of which they are sympathetic, without the larynx being affected; in rare instances even, they may precede the affection of the glottis, and be associated with it. When convulsions or general spasms supervene, they are often very severe and tetanic.

7. This affection of the larynx, either in its simple state, or when associated with the carpo-pedal contractions, or with more general spasm or convulsion, rarely presents itself without more or less evidence of disorder of the general health, in connection with more especial derangement of either the digestive organs or of the cerebral circulation or functions, or with dentition. In some cases, however, where the affection is connected with irritation near the base of the brain, the constitutional disorder may not be very manifest at first, the sleep being sound, the appetite good, and the countenance lively. But, if the state of the patient, while sleeping and waking, be very closely observed; if the evacuations, the state of the abdomen, and of the gums, the position in bed, the temper, the expression of the countenance, and the state of the brows upon exposure to light, &c. be attentively examined, evidence of disorder will be found in either the brain, or in the digestive organs, or in the gums, or even in all of them in many cases, but most generally in the brain and digestive organs, sometimes in both; and very rarely, and then merely accidentally, will there be found any affection of the respiratory passages, such as catarrhal, or bronchial, or tracheal irritation. Although the early state of the affection may be connected with, or sympathetic of, the irritation of teething merely, or of disorder of the alimentary canal, still it may become, after its continuance, or in its more advanced states, very manifestly associated with disease within the cranium, such disease being more evident as this affection proceeds.

8. *B. The diagnosis* of this affection has been well stated by Wichmann and Schmalz, and still better by Mr. Ryland. It can be confounded only with the spasmodic form of croup, with which, as I have stated, it has been, even recently, confounded by some writers of pretension. It differs from spasmodic forms of croup, in its being excited by the passions of the mind, and causes of momentary irritation, and by the irritation of distant but related parts; it occurs chiefly in those who are disposed to convulsive affections; its attacks are intermittent, distant, and irregular, and are relieved chiefly by means which impress the nervous system; it has no precursory signs, but attacks suddenly and unexpectedly; there is neither fever, cough, nor pain; catarrhal symptoms form no essential part of it, and it presents, after death, no traces of irritation in the respiratory passages: whilst *spasmodic croup* depends upon cold, damp air, and sudden atmospheric vicissitudes; and the fits of difficult breathing in it are attended by cough, the symptoms gradually subsiding, or being more quickly relieved by the accession of vomiting: it presents remission in the day, with exacerbations in the evening and night, and generally terminates with a glairy expectoration, &c. (See Croup, § 14.)

9. *C. Causes.* — The *more remote causes* are not very manifest. *Infants* and *young children* are most disposed to it. Dr. Hamilton considers it peculiar to the period of cutting the deciduous teeth. Dr. Clarke thinks that it seldom occurs after the third year. Mr. North says that the earlier symptoms generally appear between the third and seventh month, and that the disease seldom occurs after the appearance of the teeth. I have rarely met with it after the third or fourth year. The numerous instances I have seen, and I have had as many as three cases under treatment at the same time, have been generally between the third month and third year of age. It may doubtless occur at a more advanced age; but most of the cases which have been said to have occurred from four or five to ten or twelve years of age have been cases of the more spasmodic forms of croup.

10. Children who are hereditarily predisposed to cerebral affections; who are of a scrofulous diathesis; and who are insufficiently nourished, or live in a close or unwholesome air; those brought up by hand, or who are delicate during the early months of existence, or are reared with difficulty — whose sutures are long in closing, and whose digestion and assimilating processes are weak and readily disordered, are the most prone to this affection.

11. The pathological states of which it is most frequently sympathetic, or by which it is generally caused, are, functional disorders of the digestive organs, especially the alimentary canal and liver; difficult or delayed dentition, generally with signs of irritation, tumefaction or inflammation of the gums, or with the appearance of several teeth at the same time; inflammatory states of the membranes of the brain, changes in them or in the cerebral structure, or irritation about or near the base of the brain, or effusion into the ventricles; tubercular formations in the membranes, or within the cranium; enlargements of the glands, or of the thymic gland; and scrofulous enlargement or other disease of the cervical glands, or of the glands at the root of the lungs, whereby the recurrent or other laryngeal nerves are irritated or pressed upon.

12. *D. The nature of the disease* has lately been the subject of much discussion. It has not been very recently disputed that the larynx itself is entirely free from lesion: that is admitted. The questions are: is this an affection depending upon inflammatory irritation — or irritation of any kind — at the roots or origins of the laryngeal nerves, or communicated to, or existing in any portion of them, whereby the muscles which constrict or close the glottis are unduly contracted, — is it spasm of these muscles from direct or indirect irritation and sympathy; or is it owing to pressure upon the nerves which actuate the muscles which open the glottis, thereby paralysing them? The crowing or shrill inspiration, with the struggles to inspire, dread of suffocation, &c. are unquestionably owing to a more or less complete closure of the glottis; but that the closure results from *spasm* of the constrictors, or that it proceeds from *paralysis* of the dilators of the larynx, are the points requiring to be proved. The disease may be the result of either morbid condition — either may be considered as sufficient to cause it; and we may even admit that the one condition may produce it in some instances, and the other in different cases. The former of these views — or the opinion that

the affection proceeds from irritation at the origin of the nerves, or in the nerves themselves, which supply the muscles constricting the glottis, or from irritation in distant but related parts acting sympathetically upon these nerves,—was the one very generally entertained, until Dr. LEY proposed the opposite or latter view.

13. There can be no doubt of the digestive organs or of the gums sometimes evincing disorder in connection with the first appearance of the laryngeal affection, and without any sign of disorder within the cranium; and there can be no doubt of the chief and primary indications of disorder having manifested themselves occasionally in the head; and it is equally evident, that whatever lesion, either during life or after death, observed in the brain, has often been super-induced by, or has been the consequence of, previous disorder, or of the repeated attacks of laryngeal suffocation and the consequent congestion of the brain. I have even seen cases in which the brain appeared either primarily or very early affected in connection with the stridulous respiration, and yet, after every disorder referable to the brain had been quite removed, both the suffocating inspiration and the carpo-pedal contractions continued, although in milder grades, and recurred until the digestive functions and secretions were brought to a healthy state, and the child had had the advantage of change to a pure and healthy air. Views as to the nature of this affectioa should not be based upon the history of a few cases, but upon that of many, and upon *post mortem* examinations. Some cases have appeared to proceed from dentition only, others from disorders of the digestive organs merely, and others from disease of the brain; and yet, upon examination after death, those cases which have manifested even the least amount of cerebral disorder during life have presented great congestion and vascular injection of the brain and its membranes, particularly about its base and near the medulla oblongata, sometimes with effusion of serum, in rare instances even of blood between the membranes, and in the ventricles, especially the fourth ventricle. In many of such cases, there can be no doubt of the lesion within the brain being the consequence of attacks of this affection, and more particularly of the paroxysm which terminated the life of the patient. One argument in favour of the opinion that the lesions observed within the cranium are the consequences, rather than the causes, of this affection is, that the same state of parts in this situation is generally found unconnected with any obstruction to respiration. In such cases, however, it is difficult to determine whether or no lesions apparently the same are actually so; and it should be kept in mind that, owing to the physical conditions of the parts inclosed by the cranium and spine, congestion or effusion will produce not only pressure in its immediate vicinity, but also counter-pressure in the most remote parts of those inclosed in them.

14. Whilst Mr. RYLAND and Mr. NORTH believe that the dependence of this affection upon disease within the cranium is not proved, and whilst Dr. MARSH seems to think that it may proceed from inflammation of or at the origin of the pneumogastric nerve, Dr. LEY imputes it to paralysis of the muscles which open the glottis, in consequence of the pressure of enlarged glands upon the recurrent nerves in some part of their course. The glands, to the enlargement of which he ascribes the crowing inspiration, are those at the roots of the lungs, both before and behind the bifurcation of the trachea, with others which lie upon the arch of the aorta, and not unfrequently between the carotids and the deep-seated chain of cervical glands, or *glandulæ concatenatæ*. That these glands are often enlarged in infants and young children, particularly those of a scrofulous constitution, cannot be denied; and that, when thus enlarged, they may occasionally press injuriously upon the recurrent nerves and produce this affection, may be the case; but that it always proceeds from this cause is not in accordance with my experience; for I have seen cases in which no evidence of enlarged glands was furnished either during life or after death; and, besides, the affection will often altogether cease, after having been present for a day or two, upon having recourse to means which could either but little affect the state of these glands, or not affect them in so short a time. The recent experiments, however, of Dr. REID (*Ed. Med. and Surg. Journ.*, vol. xlix.) have shown that the superior laryngeal nerve is almost entirely a sensory nerve, and that the recurrent is almost exclusively motor, supplying both constrictor and dilator muscles; and that severe dyspnœa, amounting to suffocation, may arise from *irritation* and *compression* of the inferior laryngeal nerves, or the trunks of the pneumogastrics. For when both or even one recurrent nerve was irritated, the arytenoid cartilages were approximated, so as in some cases to shut completely the superior aperture of the glottis. When the recurrents are cut and compressed, the arytenoid cartilages are no longer separated during inspiration, and their movements are so completely passive, that they are carried inwards by the current of entering air which they consequently impede, whilst they are separated again by the expiratory blast.

15. My own observations of this disease lead me to infer:—1st, that it may proceed from direct or reflected irritation merely — the primary source and seat of such irritation being either in the gums or in the alimentary canal, or about the base of the brain or medulla oblongata; 2d, that the frequent result of attacks of this affection is to develope whatever disorder may primarily exist within the cranium, and to occasion inflammation, or congestion, or effusion in this situation; 3d, that irritation commencing in either of the three quarters just assigned may be sometimes propagated to the recurrent nerves, and expressed through them in the muscles of the larynx; 4th, that the carpo-pedal contractions or more general convulsions are frequent complications or associations of this affection, are often merely contingent, and, although they may proceed from the same source, may nevertheless arise from different sources, of irritation; 5th, that when the laryngeal affection is thus associated, there is greater reason to believe that the parts about the base or centre of the brain are more especially implicated; 6th, that, even in those cases where enlarged glands exist and press injuriously upon the recurrent or other nerves, it is quite as likely that they irritate as that they paralyse these nerves; 7th, that the effects observed to follow an enlarged thymus gland, about to be noticed, although illustrating

the influence of enlarged glands in producing this affection, do not prove that the influence is more that of pressure, than that of irritation, of the laryngeal nerves; 8th, that enlargement of either the thymus, or the bronchial glands, or the glandulæ concatenatæ, may act injuriously by pressing on the veins, and thereby preventing the return of blood from the head; congestion, effusion, and pressure of parts within the cranium resulting therefrom, and giving rise to the affection of the larynx, by either irritating or paralysing the laryngeal nerves.

16. *E. Closure of the Larynx by enlarged Thymus Gland.—Thymic Asthma*, of Kopp.—Mr. Hood of Kilmarnock first directed attention to enlargement of the thymus gland, and its influence in producing morbid closure of the glottis, with suffocation, and pressure of the veins returning the blood from the brain. This memoir, although little attended to at the time of its publication, is one of the most important that has appeared in recent times, and contains the particulars of nine cases, in which the appearances were observed after death, with several important pathological inferences. (See *Edinb. Journ. of Med. Science* for Jan. 1827, p. 39.) More recently (1830) the subject was treated of by Kopp, Hirsch, and Dr. Montgomery. Still Mr. Hood's memoir is the most full and circumstantial which has hitherto appeared on the subject. A few cases of the disease have been seen by me since my attention was directed to it by this writer; and three of them were examined after death, the appearances being altogether the same as those described in Mr. Hood's paper. The enlargement of this gland is apparently of a scrofulous nature, as it is sometimes connected with scrofulous enlargement of other glands. It may, however, be the result of simple hypertrophy and inordinate distension of its substance by vascular congestion, favoured by constitutional peculiarity and over-feeding. In some cases the gland is denser, redder, and more fleshy than natural. Occasionally it exudes a milky fluid when divided; and, according to Mr. Hood, a cream-coloured or puriform fluid. In two cases this writer found abscess and ulceration of this gland. In other instances it has contained tubercular matter, or a substance resembling cheese. When the enlargement has induced a congested state of the brain, probably with some degree of serous effusion within the cranium, owing to its pressure on the veins in the top of the chest, it may be expected that surprise, sudden excitement to cry, or bodily efforts will bring on attacks of this affection, by aggravating the morbid conditions upon which it depends.

17. *a.* Mr. Hood has noticed the following varieties of this affection. The *first* modification consists of an enlargement of the gland without any obvious cause, and when the child apparently continues to enjoy perfect health. Most frequently slight injury or sudden surprise is assigned as the cause of inducing an effort to cry, without the child being able to raise the voice, during which the face becomes livid, respiration is suspended, and strong convulsive struggles seem about to terminate its existence. If now the child be able to make an inspiration, the functions are soon restored, and in a short time it recovers its wonted health and spirits. An attack of this kind is attended by the utmost danger; yet, by adopting means for promoting health, the child may never have a return of the complaint. In the *second* form, the child still retains its usual plumpness, but the flesh is soft and flabby, and the countenance somewhat pale, and, on crying, quickly becomes pale and livid. On awakening out of sleep, or beginning to cry, the infant seems incapable of making an inspiration, the face becomes livid, and there is an appearance of alarming convulsions; but generally these symptoms suddenly cease on taking the child up. The same kind of fits may be brought on by feeding, dressing, crying, &c., or by whatever excites or irritates it. At first the attacks are seldom, but they become frequent as the disease makes progress. Yet it occasionally happens that the child improves in every respect for weeks or months, and yet it suddenly expires in an attack. In all such cases, the veins of the meninges are found after death loaded with blood, with more or less serous effusion between the membranes and in the ventricles. The veins of the neck and top of the chest are much distended by the pressure of the enlarged gland, and the heart is void of blood or coagulum. In a *third* class of cases which Mr. Hood has noticed, the voice is altered just before and after the fit, and has a croupy sound, which is not heard during the height of the attack, for then respiration is altogether suspended. He considers the complaint to be much modified by derangement of the stomach, or by intestinal irritation, or by difficult or painful dentition.

18. It is very difficult to *distinguish* these cases from those arising from other causes, as noticed above (§ 13—15.); and it is probable that many of those attacks which have been referred to disease within the cranium, or to dentition, disorder of the alimentary canal, and to scrofulous glands irritating the recurrent nerves, have been instances of the disease caused by enlargement of the thymus gland. The symptoms, particularly as respects the stridulous inspiration, the threatened suffocation, and the occasions and recurrence of the attacks, are very nearly the same; and I know, that most of the cases which I have seen since the publication of Mr. Hood's paper would have been considered cases of laryngeal affection from the more remote causes of irritation if that paper had not appeared; which paper I believe to have originated the views of Ley, Kopp, and others. Still all cases of laryngeal suffocation, appearing spontaneously in children, do not proceed from enlargement either of this gland or of any other, for undoubtedly some cases arise from the causes noticed above (§ 13. *et seq.*); and, in these, the glands of the neck and top of the chest are either unaffected or not materially affected. Indeed, it is not yet fully shown whether or not the symptoms are caused more by the pressure of the enlarged glands upon the veins, and the consequent congestion, pressure, or counter-pressure, of the parts at the origin of the laryngeal nerves, than by the direct effects of these glands upon the nerves in their course. If they proceed from the former condition, they are the consequences of the superinduced state of parts at the base of the brain, and they may appear whenever the same state of parts arise either primarily, or from other causes.

19. *b. The diagnosis* of enlarged thymus gland is a matter of importance, but of difficulty. It may, however, be inferred to exist when the infant

is gross, pale, flabby, and scrofulous; when the attacks are severe, suffocative, and unattended by any marked evidence of head-affection, or of disorder of the alimentary canal; when there is distension of the veins in the neck; when the lower part of the neck, between the inferior attachments of the sterno-mastoid muscles, appears full or tumid; when the top of the sternum seems elevated, or pushed out, and when there is dulness on *percussion* under the sternum, particularly its upper portion, and on each side of it. Fulness of the veins about the head and neck, without any obvious cause, or an unusual increase of that fulness when the head is somewhat low, should excite a suspicion of the existence of this lesion. This form of the disease is most common in children from a few weeks old to the age of two or three years; but it not infrequently appears in those of four or five years of age, and it may even occur in grown up or aged persons.

20. *F. The prognosis of stridulous affections of the larynx* should be stated with much reservation and caution. A child that has once had an attack should be considered in a precarious state, as long as it evinces any sign of disorder, or until the period of first dentition has passed. The risk increases with the severity and frequency of the fits, and when they are associated with the carpo-pedal contractions or general convulsions. If the affection proceed from enlargement of the thymus or other glands, the danger is also greater than when it seems to depend upon dentition or disorder of the digestive organs only. If it appear in the course of disease within the cranium, particularly of meningitis and hydrocephalus, it is generally fatal, although I recently attended a case of this kind which recovered. The most *favourable* circumstances are a sound constitution, the attacks being slight and rare; the absence of affection of the brain, and of scrofulous disease of the thymus or other glands; and the ability to have change of air, especially to the sea-side.

21. *G.* Treatment.—The *intentions* with which the treatment of stridulous laryngeal affections should be conducted, are — 1st, To avoid the occasions or exciting causes of the paroxysms, — 2d, To remove the morbid conditions on which they depend; — and 3d, To endeavour to prevent the paroxysm from being followed by dangerous or fatal results. — *a.* The propriety of *avoiding the occasions* and causes by which a return of the fit is produced is so obvious as to require only the most cursory notice. Every source of excitement and irritation, both moral and physical, should be guarded against; and efforts of all kinds, especially straining at stool, ought to be avoided. Sudden surprises, and disturbances from sleep, excitement of the temper and passions, as well as all muscular efforts, should be shunned; and all the secretions and excretions ought to be freely promoted, without exhausting the powers of life.

22. *b.* The *removal of the morbid conditions* on which the paroxysms depend is obviously the most important indication. This should be attempted only after a careful examination of symptoms, especially those connected with the head and scalp, with the gums, and with the stomach and bowels. Sources of irritation in the chest, particularly in the top of it, and in the neck, should be carefully inquired after.—*α.* The frequent connection of stridulous affections of the larynx with *dentition* ought always to suggest an instant examination of the state of the gums; and if fulness, redness, dryness, or heat of them be present, or any other indication of irritation, and especially if the salivary flux, which usually attends dentition, be suppressed or scanty, a free division of the gums in the situation of the advancing teeth, and a recourse to sialogogues of a mild kind, should not be delayed.

23. *β.* If signs of disease within the cranium either have preceded or accompany the laryngeal affection, the treatment must be directed with a strict regard to the nature and intensity of such disease. The accession of carpo-pedal contractions, of general convulsions, or of strabismus, does not prove the existence of inflammatory action of the brain, for the paroxysms of laryngeal suffocation, by interrupting the return of blood from the brain, may have occasioned congestion, irregular circulation, or even serous effusion within the cranium, so as to give rise to these symptoms. However, inflammation may exist, and be accompanied with those and with other phenomena, especially in its advanced stages. Of themselves, these symptoms, indicate the necessity of relieving the oppressed brain, and restoring the healthy balance of the circulation in this quarter; but these ends cannot be attained by trusting to bleeding only or even chiefly, whereby the powers of life are often too far reduced without removing the morbid state of circulation in the brain. Bleeding, however, is generally required, but it must be resorted to according to the state of vascular fulness and power, and be aided by purgatives, alteratives, diuretics, cold affusion on, or frequent cold sponging of, the head, and derivatives, according to the features of individual cases.

24. *γ.* If the *stomach and bowels* are disordered, stomachic purgatives conjoined with alteratives, and given so as to act regularly and moderately, are required. Flatulence and acidity, which commonly are present in these cases, should be removed by prescribing alkalies or absorbents in conjunction with aperients and tonics. Small doses of calomel, or the hydrargyrum cum cretâ, may be given with calcined magnesia, or with the dried sub-carbonate of soda and rhubarb or jalap; and a mild tonic infusion may be prescribed, with a little of the sesqui-carbonate of ammonia, and of some carminative spirit. But chief reliance should be placed on change of air, on exercise out of doors, on cold sponging the head and general surface, and on cold salt water bathing when the patient can bear the shock of the bath, which should be cautiously and gradually tried.

25. *δ.* The presence of *eruptions* on the scalp, or of *enlargements of the glands* of the neck, should lead to examination of the state of the lower part of the neck and of the top of the chest, particularly in scrofulous, cachectic, gross, and unhealthy-looking children; and although in these disease may also exist, either in the digestive organs, or within the cranium, or in both these quarters, still enlargement or scrofulous changes of the more deep-seated glands, interrupting the return of blood from the head, and irritating the recurrent nerves, may be a chief or a concurrent cause of the laryngeal affection. In such cases, as well as in those where the thymic gland is apparently enlarged, strict attention to the state of the secretions and excretions, the exhibition of mild and tonic aperients and alteratives,

small doses of the iodide of potassium, with liquor potassæ, and sarsaparilla, change of air, especially to the sea side, an appropriate diet, and warm clothing, are the means chiefly deserving notice. An ointment with iodide of potassium may be employed externally, but the judicious use and combination of this substance, as an internal medicine, render it the most deserving of confidence in these cases. The preparations of quinine and of iron, especially the iodide of iron, and the compound steel mixture with liquor potassæ, are also of service, especially in cachectic, flabby, and pallid children; but as respects patients affected with any form of laryngeal affection in large towns, no means are so effectual as change to a pure, temperate, and dry air, especially in scrofulous constitutions, and without such change all other remedies may fail.

26. *c.* The *removal of the attack* seldom becomes the office of the physician; for the fit is usually short, and if it were not so, death would generally very soon result. The child should be held up, and somewhat forwards; and if respiration does not instantly follow, cold water may be sprinkled over the face, or it may be affused over the head, whilst the lower part of the body is plunged in warm water. If these measures fail, the shoulders and back may be slapped with the open hand or with a wet napkin, and stimulating salts may be held near the nostrils; but these are then rarely of avail. In those cases of laryngeal affection where the inspiration is made partially, and with a crowing and stridulous noise, and is not altogether prevented, and consequently where there is time to exhibit an *emetic*, one should be given forthwith, conjoined with a little camphor; and a warm bath, or the semicupium may likewise be resorted to. I have seen, however, the emetic fail to act in these cases, although it was given in a sufficiently large dose, owing to the oppression of the brain by the interruption to the return of blood from it; but, upon resorting to the affusion of cold water upon the head, the emetic effect was produced.

27. If none of the measures just proposed is attended with success, recourse to the operation of *tracheotomy* has been suggested by Mr. PORTER and Mr. RYLAND. It certainly, however, is not justifiable, as the former of these writers has stated, as long as respiration is carried on even with the greatest difficulty; for in almost every case in which the rima glottidis remains so far open as to allow of a partial transmission of air, the affection is not very severe, and the child will struggle through it. "But if," he remarks, "the child is to all appearance dead, and if the practitioner is called to him within any reasonable time, he should then, with the least possible delay, endeavour to inflate the lungs and restore animation by whatever means appear to be the speediest, and of these perhaps the most preferable will be tracheotomy." Dr. MARSH states, that Dr. JOHNSON had seen a child, in a state of asphyxia caused by this disease, recovered from apparent death, by the instantaneous application of artificial respiration.

28. ii. SUFFOCATIVE LARYNGEAL AFFECTION IN ADULTS.— *Croup-like Respiration in Adults.* — *Spasm of the Glottis in Adults.* — This affection, as it occurs in grown-up persons, proceeds from *three* principal sources: — 1st, *Tumours* of any kind pressing upon or irritating the laryngeal nerves, or pressing upon the veins; 2d, *Inflammation* or irritation of adjoining parts, as of the pharynx, epiglottis, œsophagus, &c.; and, 3d, *Sympathy* with the state of more remote parts, as in cases of hysteria and of irritation of the sexual organs, or spinal nerves.

29. *A. Tumours* of various kinds, small abscesses, and scrofulous deposits in, or enlargement of glands, may form in the immediate vicinity of the larynx and trachea, or between them and the œsophagus, and occasion fits of suffocation or stridulous or croup-like respiration. MORGAGNI, RUSH, and others have recorded instances of this kind, and I have observed them. Bronchocele, aneurisms of the arch of the aorta, or of the arteria innominata, and enlarged or scrofulous glands at the top of the chest, sometimes produce a similar effect.

30. *a. Bronchocele,* particularly in nervous and hysterical females, is very frequently attended by attacks of stridulous or croupy respiration, or fits of suffocation, especially upon mental emotion or physical efforts; and this is the more especially the case about the periods of menstruation, or when any irregularity of this discharge exists, as often observed in bronchocele affecting persons of this sex. — *b. Scrofulous* and *suppurating glands,* particularly those which are much enlarged, or contain purulent or scrofulous matters, in the vicinity of the trachea or larynx, act in the adult in a similar manner to that mentioned in cases of children (§ 14. *et seq.*). In a case on which I was recently consulted, a cluster of glands at the root of the lungs were remarkably large and infiltrated with tubercular matter, so as to form a very consistent tumour, producing not only more or less dyspnœa, owing to its pressure on the trachea, but also fits of suffocation, in one of which the patient expired. This case closely simulated one of aneurism of the arch of the aorta, owing to the size of the tumour and to the pulsation of the aorta being communicated to it. I have likewise seen the laryngeal affection caused by a fungoid tumour — a true *fungus hæmatodes* — attached to the posterior aspect of the top of the sternum. — *c.* Of the influence of *aneurismal tumours* in producing attacks of this affection no proof need be offered, as such instances are of frequent occurrence, and instances of them have been published by LAWRENCE, FLETCHER, and others.

31. *B. Inflammation of adjoining parts,* as of the pharynx, or of the œsophagus at its upper part, sometimes is attended by spasm of the glottis, particularly in nervous persons and hysterical females. In these, even the irritation of the pharynx or of the epiglottis, caused by the ascent of acrid eructations in the course of indigestion, or of the globus hystericus, or of flatulence in connection with hysteria, sometimes produce similar attacks. The irritation occasioned by an elongated uvula, either upon the epiglottis or upon the rima glottidis, has had the same effect in some cases. (See THROAT, *Diseases of.*)

32. *C. The irritation* of the sexual organs, or of the spinal nerves, is occasionally connected with this affection, which then assumes the form of irregular *hysteria,* and in such circumstances an attack is often produced by cold, or slight inflammatory action in the respiratory passages, which, from its severity and recurrence, may be mistaken for acute or chronic laryngitis, if the

various nervous and hysterical symptoms attending it be overlooked. In cases of this kind, an attack may be brought on by violent mental emotions, especially if the digestive or respiratory organs be in an irritable state at the time; but it seldom occurs unless the uterine functions be also disturbed, as indicated by either a disordered state of the catamenia or by leucorrhœa (see art. Hysteria, § 31. 37.). It should, however, be always kept in recollection, that cases in which there is some degree of inflammatory action and much spasm are often met with in females, particularly those liable to hysteria. I have seen several cases of this description, which required a treatment appropriate to their mixed nature. Severe attacks of spasm of the glottis are very apt to occur in the course of hooping-cough or bronchitis, when either of these occurs in nervous or hysterical females; and will readily be aggravated by a too lowering treatment.

33. *D.* Treatment.—It is obvious that the treatment of these affections should depend entirely upon the pathological conditions producing them. — *a.* When proceeding from *tumours* of any kind, or from small abscesses, or scrofulous enlargements of glands, the iodide of potassium, and liquor potassæ, taken with sarsaparilla, are the most efficient means which can be resorted to; and are especially useful when the affection is caused by bronchocele. If hysterical symptoms be present, the iodide of iron may be employed, or the foregoing medicines may be given with any of the preparations of valerian or of camphor. It is obvious that the dependence of this affection on aneurism, or on malignant tumours, almost precludes any hope of cure, and admits only of temporary alleviation.

34. *b.* Where inflammatory irritation of the pharynx, or upper part of the œsophagus, is attended with spasm of the glottis, means must be employed to remove the inflammation, and these will generally also prevent the occurrence of the spasm. After such depletions as the nature of the case may require, much benefit will result from the use of a linctus containing, in a lubricating and an emollient vehicle, a small quantity of the nitrate of potash, or of the hydrochlorate of ammonia, with a little vinum ipecacuanhæ, and any narcotic or sedative tincture or extract; and, if the spasms continue, a rubefacient embrocation may be applied around the neck and throat. The following have been often prescribed by me with almost instant relief, the embrocation being applied around the throat on flannel, until much heat and redness of the skin are produced.

No. 284. ℞ Potassæ Nitratis ʒjss. (vel Ammoniæ Hydro-chloratis ʒss.); — Mucilag. Acaciæ; Syrupi Tolutani, āā ℥jss.; Vini Ipecacuanhæ ʒjss.; Tinct. Hyoscyami ʒij; Cetacei, vel Pulv. Tragacanth. q. s. ut secundum artem fiat Linctus a quo pauxillum, urgente dyspnœa, lambat æger.

No. 285. ℞ Linimenti Camphoræ Comp.; Linimenti Terebinthinæ, āā ℥jss.: Olei Olivæ, ʒiij.; Olei Limonis, et Olei Cajuputi, āā ʒj. M. Fiat Embrocatio, more dicto utenda.

35. *c.* The *Hysterical* or nervous form of spasm of the glottis is almost instantly relieved by having recourse to the above *linctus* and *embrocation.* If these fail, which is rarely the case, camphor may be given with a narcotic, with the extract of belladonna, of opium, of henbane, &c., or with a full dose of Dover's powder. The preparations of valerian with ammonia are also of use. When the affection of the glottis is connected with inflammatory irritation, either in the bronchi, or about the pharynx, perseverance in the linctus and embrocation, varied according to circumstances, will generally remove both the one and the other. The disorder of the uterine functions, or the morbid conditions connected more immediately with the hysterical affection, will next require attention, particularly with a view of preventing a return of it. (*See* Hysteria —*Treatment of.*)

iii. Atonic and Paralytic States of the Larynx. — Synon. Αφωνια, *Aphonia* (from the privative *α*, and *φωνή*, voice, sound). — *Loquela abolita, Defectus loquelæ, Dysphonia,* Auct. var. — *Raucedo paralytica,* Darwin. — *Sprachlosigkeit, Stummheit,* Germ. — *Aphonie,* Fr:— *Afonia,* Ital.

Classif.—IV. Class; III. Order (*Author*).

36. Defin. — *A partial or complete loss of voice and speech, owing to an atonic or paralytic state of the nerves of the larynx.*

37. This affection is generally *symptomatic,* but it is occasionally primary or *idiopathic,* as when it is caused by an exertion of the voice much beyond the power or tone of the parts: it is, however, then rarely or never complete. The term *aphonia* has often been employed synonymously with *mutitas* or *dumbness,* with which *loss of voice,* or aphonia, has thus been confounded. But in dumbness, or mutitas, the voice exists; it only cannot, owing to the abolition of the sense of hearing, be modulated into articulate or certain sounds. In aphonia, the voice is either partially or totally lost, the power of articulating existing when the voice is partially retained. In rare instances, however, the partial loss of voice is attended by a loss of the power of articulation, and, in this case, the powers of deglutition are also more or less lost. Aphonia, in various grades, may arise from a great variety of circumstances, and of morbid conditions, which may be arranged under the three following heads — 1st, *Functional* or *nervous* loss of voice; — 2d, *Catarrhal* aphonia; — 3d, Loss of voice from *inflammations* of the larynx and their consequences; — 4th, Aphonia from *tumours* of various kinds in or near the larynx; — and 5th, Aphonia from *disease, or injuries,* at the origin, in the course of, and affecting, the laryngeal nerves, so as to paralyse them.

38. *A. Functional or nervous loss of voice* may be said to be a more or less complete abolition of nervous power in the muscles of the larynx, independent of inflammation, or of organic disease of adjoining or of related parts. The *primary state* of this form of aphonia is generally caused by debility, and excessive efforts of voice, or inordinate exertion of the vocal organs. It may likewise result from overwhelming emotions of the mind, from sudden moral or physical shocks, from chills caused by sudden exposure to cold, or by drinking cold water, and from masticating narcotic plants in mistake. More frequently, however, it is merely one of the very numerous modes, in which *hysteria* in its irregular form manifests itself, and is then generally connected with irregular, difficult, or suppressed menstruation, with uterine irritation, &c. (See Hysteria, § 37.) In these circumstances the paralysed state of the muscles of the larynx may be attributed to an irregular distribution of nervous energy, connected either with exhaustion or with derivation to distant parts. This form of aphonia may be of very short or very protracted duration. It may recur frequently, or only at distant periods. It may also be only par-

tial, or altogether complete, and amongst the most difficult affections to remove.

39. *B. Catarrhal Aphonia* is of frequent occurrence, particularly in females. It is probably connected with congestion of the mucous membrane of the larynx and epiglottis, and impaired action of the laryngeal muscles. In its more complete and prolonged states, it is also partly owing to nervous or hysterical disorder, catarrh exciting and aggravating the functional affection. Catarrhal aphonia is usually accompanied with relaxation of the uvula, and catarrhal congestion of the posterior nares and pharynx, with an atonic condition of the adjoining parts, which is extended to the larynx.

40. *C. Inflammation*, its *consequences*, and *other organic changes*, as tumours, &c. seated in or near the larynx, occasion, as shown in other places, more or less complete aphonia. In the purely inflammatory states, the injection, thickening, tumefaction from effusion of serum in the connecting cellular tissue; and the impaired as well as embarrassed action of the muscles, always attending inflammation of their surrounding and connecting tissues, sufficiently account for the hoarseness of voice, and aphonia which accompany them. When œdema of the larynx, or when ulceration, or any other of the consequences of common or of specific inflammations, exists so as to injure or to destroy, more or less, the mechanism by which voice is produced, then no further agency is requisite to account for the phenomenon. The same organic lesions, which I have shown above (§ 28. *et seq.*) to be occasionally causes of spasm of the larynx, may also, particularly when they mechanically impede the motions of this part, or when they paralyse its nerves, produce aphonia. Tumours of any kind, or abscesses, will have this effect, when situated so as to act in either way.

41. *D. Lesions within the Cranium*, when they disorganize, press upon, or otherwise implicate the origins of the laryngeal nerves, or similarly affect them in their course, will cause complete aphonia, generally also with loss of the power of articulating, and sometimes also of deglutition. In these cases, congestion, effusion, or other changes of an organic or of a scrofulous kind have taken place at the base of the brain, near or in the medulla oblongata; or counter-pressure caused by effusion of blood or of lymph, or by scrofulous or other tumours in the vicinity, or even lesions of the dura mater or bones of the base of the cranium may have produced this effect. Aphonia from these changes either attends, follows, or even precedes apoplectic, paralytic, or epileptic seizures; and may generally be considered a very unfavourable circumstance, as patients thus affected rarely continue long exempt from a fatal seizure.

42. In some cases of this kind, inarticulate sounds may be uttered, the power of modulating the voice, and of articulating being lost. I was called upon some years ago to visit in consultation a gentleman who several months previously had lost the power of articulating any sound, however simple. The movements of the tongue were nearly abolished, and the power of deglutition, unless substances were conveyed over the root of the tongue, was lost. These were the only paralytic symptoms; and he was, in every other respect, in good health, and without any sign of cerebral disease. Treatment having proved inefficacious, my attendance after a time altogether ceased; but I learnt that he died suddenly, some months afterwards. Somewhat similar cases of palsy, affecting only the muscles of the larynx, pharynx, and tongue, have been observed by me in children, but they have generally been preceded by some acute cerebral affection, or by convulsions. In every case death has taken place suddenly; and, in those cases where inspection afterwards was allowed, organic lesions were found about the medulla oblongata, or at the base of the brain, and consisted either of those alluded to above (§ 41.), or of softening of the cerebral structure.

43. *E.* TREATMENT.—The plan of cure should entirely depend upon the evidence furnished as to the existence of either of the morbid states to which aphonia has now been referred.—*a.* If the loss of voice result only from relaxation or atony of the vocal chords owing either to debility or to over-exertion, *gargles* containing capsicum, a warm *rubefacient embrocation* around the throat, and tonic decoctions or infusions, with mineral acids, or other *tonics*, will generally be of service. If it be connected with *hysteria*, the same means as now advised, and the preparations of valerian, camphor, ammonia, iron, &c., may severally be employed, according to the state of the uterine functions and constitution of the patient. In the more obstinate of the nervous and hysterical cases of aphonia, *electricity* has been advised; and in these, I have found the *pyrethrum*, or other stimulating substances, used perseveringly, as *sialogogues* of great benefit. Occasionally an active *emetic*, consisting of ipecacuanha, decoction of senega, and some preparations of squills, has proved of service, particularly when followed by a stomachic purgative, and the tonic and stimulant remedies just mentioned.

44. *b.* When aphonia is *catarrhal*, the emetic and subsequently a stomachic purgative, diaphoretics, stimulating gargles, and embrocations, applied to the throat or around the neck, are generally of service. If it proceed from inflammation, œdema or ulceration of the larynx,—from destruction of the cartilages, or from other consequences of inflammatory action or of syphilis, the means advised for these lesions when treating of the several forms of *laryngitis* are then required.

45. *c.* If aphonia arise from *scrofulous* glands, *tumours*, or *other lesions*, paralysing the laryngeal nerves or mechanically obstructing the motions of the larynx, the internal use of *iodine*, of the *iodide of potassium*, with liquor potassæ, or BRANDISH's alkaline solution and sarsaparilla, may be tried, and aided by such other means as the peculiarities of the case will suggest.

46. *d.* When aphonia proceeds from *disease within* or *near the base of the cranium*—when it appears to usher an attack of apoplexy or palsy, or attends upon, or follows an apoplectic or epileptic seizure—when it seems to depend upon vascular congestion, effusion, or some organic lesion, the treatment must be remarkably varied, according to the nature and state of the disease of which it is a symptom. If it precede and seem to threaten an acute attack, vascular depletions, purgatives, and derivatives are indicated. If it follows such an attack, the above alteratives,

permanent derivatives, and drains, &c., particularly setons, issues, or open blisters, are requisite.

II. INFLAMMATION OF THE LARYNX. — SYN. *Laryngitis*, Swediaur. — *Cynanche Laryngea*, Cullen, &c. *Angina interna*, *Angina Canina*, Zacutus Lusitanus. *Angina trachealis adultorum*, Pinel. *Cauma Laryngitis*, Young. *Laryngite*, *Angine laryngée*, Fr. *Entzündung des Luftröhrenkopfs*, Germ. *Laryngita*, *Infiamazion di laringe*, Ital.

CLASSIF. — 1. *Class*, 2. *Order* (*Cullen*). 1. *Class*, 2. *Order* (*Good*). III. CLASS; I. ORDER (*Author in Preface*).

47. DEFIN. — *Pain, soreness, constriction, and tenderness in the region of the larynx; epiglottis swollen and erect; breathing shrill and suffocating; voice hoarse, sharp, and lastly suppressed; short painful and convulsive cough; great anxiety and restlessness, with fever and occasional spasms of the glottis.*

48. This disease was first noticed with precision by the second MONRO, HOME, and CHEYNE, and subsequently by FARRE, BAILLEY, BLANE, and others. The varieties which it presents in practice have been particularized by CHEYNE, CRUVEILHIER, BRETONNEAU, BAYLE, TROUSSEAU, BELLOC, RYLAND, and others: but we are still without a correct arrangement of these varieties, in relation either to each other or to the complications in which they are very often presented to our observation. Before I describe the varieties of laryngitis, I shall state the *arrangement* of them which I shall adopt.

49. 1st, CATARRHAL OR SLIGHT LARYNGITIS, which often attends common colds and sore throats, and is characterised chiefly by cough and hoarseness of the voice. It generally subsides in the course of a few days, and often without the aid of medicine; but, in faulty or cachectic constitutions, or in the highly inflammatory diathesis, it may pass into some one or other of the following varieties.

50. 2d, ACUTE LARYNGITIS may appear, as other inflammations, either *primarily* or *consecutively*, and present certain forms depending upon diathesis, previous disorder, and epidemic influence. It may be *sthenic*, as when it occurs in a previously healthy constitution; — or *asthenic*, when it affects weak or cachectic habits, or appears in connection with some other malady. — *A. Sthenic Acute Laryngitis* may be — *a. Primary* and *simple*; commencing in, and limited chiefly to, the larynx and epiglottis, and attended by acute inflammatory fever. — *b.* It may be *consecutive*, and *complicated* with inflammation of the fauces, tonsils, and pharynx; or of the trachea and larger bronchi, &c., as in sporadic and epidemic croup (*Diphthérite*); albuminous exudations forming on the inflamed surface, and the attendant fever being of an inflammatory or sub-inflammatory character. — *B. Asthenic Acute Laryngitis* may be — *a. primary* and *simple*, with effusion of serum, or of a sero-puriform matter in the sub-mucous tissue of the larynx and epiglottis, the attendant fever being more or less adynamic or malignant, and the constitutional powers impaired. — *b. Secondary* and *complicated*, as when it occurs consecutively upon scarlatina, small-pox, erysipelas, or malignant sore throat, low fevers, &c.

51. 3d, CHRONIC LARYNGITIS, which may be either *primary* or *consecutive* of the acute, or of disease of related parts. — *a. Simple chronic laryngitis*, limited chiefly to the larynx and epiglottis. — *b. Complicated chronic laryngitis*, associated with disease of the lungs, generally of a tubercular or scrofulous nature, or with chronic bronchitis. — *c. Specific* or *syphilitic laryngitis*, attended by secondary syphilitic symptoms, or with the venereal cachexia. These are the several forms of simple and complicated laryngitis.*

52. i. DESCRIPTION. — *A.* CATARRHAL LARYNGITIS is generally slight, and often attends catarrh, particularly when the catarrhal irritation extends from the fauces to the pharynx. It may be viewed merely as an extension of the affection of the mucous surface of the throat, thence to the larynx, and frequently also to the trachea and bronchi on the one hand, and along the œsophagus, on the other. It is characterised by the usual catarrhal symptoms, by hoarseness or partial loss of voice, and cough, which is at first dry, but is attended by slight or more copious expectoration as the complaint proceeds. There is either little or no attendant fever, or fever of a slight remittent form. This variety may pass into the acute, but it much more frequently is followed by the simple or complicated states of chronic laryngitis. It more commonly, however, disappears spontaneously or after treatment.

53. *B.* ACUTE LARYNGITIS is a most dangerous disease in all its forms; but more especially in the asthenic complicated form. The particular character or state which it may assume depends upon the habit of body, temperament, and previous health of the patient; upon the existing epidemic influence, and upon the nature of the disease on which it is consequent, or with which it is associated. It is a formidable malady, as respects the suddenness of the attack, the alarming and distressing nature of the symptoms, the rapidity of its progress, and the frequency of its fatal issue. Its occurrence in the course of other diseases, and the fact of its being the cause, in many instances, of the great danger and fatality of these, render it a subject of great interest. Viewing it in all its relations, it may be *divided*, as above (§ 50.), into the *sthenic* or truly inflammatory, or as it affects a person in previous health, and the *asthenic*, as when it appears in the cachectic or in the course of other maladies.

* These *forms* or *varieties* of Laryngitis may be arranged as follows: —

- I. CATARRHAL LARYNGITIS, generally associated with catarrhal sore throat, catarrhal irritation of the respiratory passages, &c.
- II. ACUTE LARYNGITIS.
  - STHENIC.
    - *Primary and Simple.*
    - *Complicated.*
      - with tracheitis and bronchitis.
      - with tonsillitis, pharyngitis, &c.
  - ASTHENIC.
    - *Primary and Simple.*
    - *Complicated.*
      - with eruptive and continued fevers.
      - with erysipelas, sore throat, &c.
- III. CHRONIC LARYNGITIS.
  - *Simple* and *Primary.*
  - *Complicated*, with disease of the lungs, &c.
  - *Syphilitic.*

54. *a. Sthenic Acute Laryngitis* may appear in various circumstances; it may be, — *α. primary* and *simple* throughout; or, *β. consecutive* and *complicated.* It is of importance that it should be considered in each of these forms, and with due relation to the other affections by which it may be preceded, associated, or followed; and this will become the more evident when the more complicated states of the disease come under consideration; for several maladies in which laryngitis often forms a most dangerous part have been frequently described without any reference to it, although the extension of disease to the larynx, in either a sthenic or an asthenic form, has constituted the chief interest and risk to the patient, attending them.

55. *α. Simple Acute Laryngitis* occurring *primarily*, or in a constitution capable of manifesting the *sthenic* or true inflammatory state of vascular action, frequently appears with some degree of sore throat, difficulty of swallowing, chills or slight rigors, followed by symptomatic inflammatory fever. Soon after *the commencement of the attack* a dull pain or soreness is felt in the upper and interior part of the throat, with a sense of constriction, and tenderness when the larynx is pressed. The voice is harsh, hoarse, or sharp, and there is a slight, frequent, short cough, without expectoration. The fauces are generally red or inflamed, and when the tongue is pressed downwards and forwards, the epiglottis may be seen erect, swollen, and red. At this stage of the disease the attendant fever is strictly inflammatory, the pulse being full, quick, and strong; the skin hot and dry, the face flushed, the tongue white and sometimes tumid, and thirst urgent.

56. At a more *advanced stage*, and as the tumefaction of the inflamed parts diminishes the aperture of the glottis, the voice becomes small, piping, whispering, and ultimately suppressed; the breathing difficult, inspiration being sibilous, shrill, prolonged, and laborious; the larynx is drawn downwards with great force on each attempt to inflate the lungs. The cough is stridulous, convulsive or strangulating, and attended by scanty, viscid, and transparent expectoration, and by attacks of spasm of the glottis threatening suffocation, which are occasionally induced by difficulty of swallowing, owing to the imperfect closure of the glottis by the swollen and inefficient state of the epiglottis. The eyes almost start from their sockets. The countenance becomes pallid and anxious; the pulse feebler, quicker, and less uniform; and the surface of the body cooler. The constitutional phenomena now indicate imperfect aërification of the blood in the lungs, the lips assuming a more leaden or livid hue, and the tongue a darker colour. More or less fulness or swelling may be observed in some cases around the larynx and in the course of the trachea. The patient is now apprehensive, restless, sleepless, and desirous of embracing any means of relief, feeling that he is on the point of suffocation.

57. In the *last stage*, respiration can hardly be performed; the voice is gone; the pulse is weak, small, and intermitting; the lips are livid, the face pale and leaden; and the surface cold or clammy. The patient sits upright with open mouth and out-stretched neck, grasping objects around him to assist the laboured inspirations. In this stage, he sometimes dozes; but soon starts up in the utmost agitation, gasping for breath, with convulsive struggles. Low delirium, drowsiness, sopor, or coma now sometimes appear; the pulse becomes more and more feeble, and the patient sinks in a state of gradual asphyxia, if he be not carried off in one of the spasmodic attacks of suffocation attending the cough, or following attempts at swallowing in the advanced stage of the malady.

58. The *course* of the disease generally presents the *three stages* indicated above, when it is not interrupted by treatment. These stages may be viewed as the *first, early* or *inflammatory* stage; the *second*, or *developed* stage; and the *third* stage, or period *of exhaustion and asphyxia.* The *duration* of this form of laryngitis varies from eight or twelve hours (ARMSTRONG and CHEYNE) to several days. The more usual duration, however, is from two to five days. It very rarely is longer than a few days, unless the disease pass into the chronic form. The more completely acute laryngitis is limited to the larynx, the shorter, in general, is its duration. Cases are recorded by RUSH, TACHERON, PORTER, and others, in which the inflammatory appearances were found limited to the larynx, and a fatal issue ensued within twenty-four hours from the commencement of the attack.

59. *β. Consecutive or Complicated Sthenic Laryngitis* is characterised chiefly by the extension of the inflammation from the fauces, tonsils, and pharynx on the one hand, to the larynx; and more rarely from the trachea upwards to the larynx on the other, as in sporadic cases of croup. In all such cases, the inflammatory action is chiefly superficial and is attended by an exudation of albuminous lymph on the inflamed surface. When the disease commences in the tonsils and fauces, and extends to the respiratory passages, it has been termed "*Diphthérite,*" from διφθερα, pellis, exuvium, or "*Angine Couenneuse,*" by M. BRETONNEAU, who wrote on this subject, and confounded this form of angina, — the "*Angina Membranacea*" of the older writers — both with *Cynanche Maligna*, and with *Sporadic Croup;* and in this he has been followed by several of his contemporaries. One part of this mistake has arisen from inattention to the characters of the attendant fever, and to the superficial manner in which the local affection has been viewed. Attention to the following facts will more fully explain the source of this very egregious mistake, — a mistake fraught with danger as regards the appropriation of the means of cure.

60. Inflammations of the throat frequently occur, both as *sporadic* and as *epidemic* diseases; they may be *simple*, or they may be the chief *complication*, and source of danger, in eruptive fevers. In many instances, and particularly when they are epidemic, they are accompanied with an exudation of lymph on the inflamed surface; and whether the inflammation commences in the tonsils and soft palate, or in the pharynx, or whether it assumes a *sthenic* or an *asthenic* character, owing to the nature of the constitutional disease of which it is a part, and the circumstances connected with the patient, it is more or less prone to extend itself through the various passages leading from the pharynx; and when the larynx and epiglottis thus become affected, the disease then assumes a different and a much more dangerous character, death sometimes taking place in a few hours. In all cases, when the inflammation extends from the

fauces, tonsils, and pharynx to the respiratory passages, the local appearances and the character of the attendant fever indicate the nature and tendency of the malady. In some epidemics, and in a few sporadic cases, both the local appearances and the constitutional affection indicate an acute and *sthenic* disease, — an albuminous exudation, or a firm and continuous coating of albuminous lymph, forming on the inflamed surface, and the attendant fever being inflammatory or sub-inflammatory.

61. In other epidemics, and even in a few sporadic cases, but more commonly when the affection of the throat accompanies the adynamic or putro-adynamic or malignant forms of eruptive fever, the inflamed parts present a dark red, approaching to a brown or livid hue, and the exudations, instead of being pellicular, firm, tenacious, and whitish or yellowish white, as in the sthenic form, and adhering firmly to the surface, are soft, broken into crusts of an ash colour, become darker after their formation, and are much more easily detached. In these latter cases, the vital powers are depressed, and the circulating fluids deteriorated; hence their *asthenic* form and rapidly fatal tendency, as observed in the more adynamic and malignant states of scarlatina, small-pox, measles, or in certain epidemics, and in rare sporadic cases. (*See* § 68.)

62. These forms of angina, which are thus distinct from each other, whether appearing *primarily* or as a *complication* of exanthematous or of other diseases — whether *limited* to the throat only or *extending* to the respiratory passages — have been confounded together by several pathologists. All of them may occur in adults as well as in children, although the latter are most predisposed to them, and especially those of a delicate, scrofulous, and inflammatory constitution. When the inflammation extends to the larynx, many of the symptoms of croup are present; and hence M. LOUIS described *consecutive or complicated laryngitis* as croup occurring in adults; and M. BRETONNEAU gave it the name of "*Diphthérite,*" because of the albuminous exudation attending it, and without reference to the other local characters, and the form or state of the attending fever — matters of the utmost importance in describing the nature and treatment of anginous affections, particularly when complicating the eruptive fevers.

63. *Consecutive* or *complicated sthenic laryngitis* generally commences as above indicated; but the inflammation, instead of advancing from the pharynx to the larynx, may commence in the trachea and extend upwards to the larynx, as in some cases of croup; although this course is much more rare than the other. This form of laryngitis, as it appears either sporadically or epidemically, or as a complication of the more sthenic eruptive fevers, commonly commences with pain in the throat, difficulty of swallowing, and fever. The tonsils are swollen and red, and present on their surfaces patches of an opaque whitish concretion. If allowed to proceed, the inflammation and the membranous exudation spread continuously to the soft palate and pharynx; the glands at the angles of the jaws begin to swell, and deglutition becomes more difficult. Upon detaching the membranous concretion from the inflamed surface, the redness is increased in it, and a thicker concretion is produced on it, that adheres to it more tenaciously than the former one. Frequently some days after the commencement of the attack, the disease becomes milder, less disposed to spread, and sometimes ceases altogether without reaching the larynx; but, in most cases, laryngeal symptoms appear at the end of four or five days. A hoarse cough, altered sound of the voice, difficult deglutition, and dyspnœa, supervene. The breathing soon afterwards becomes laborious, sonorous, and quick, inspiration being prolonged, and expiration short and hissing, and the voice extinct. The countenance is now pale, leaden, and often livid, particularly during the fits of suffocation which occur, and the pulse small and intermitting.

64. The *duration* of the disease is various. The morbid action may continue in the tonsils, palate, and posterior part of the pharynx, for six or seven days before it extend to the larynx; but, after it has reached this part, death may take place in twenty-four or forty-eight hours, either from a paroxysm of suffocation, or in the slower mode of asphyxia noticed above (§ 57.) as often terminating the more simple form of the disease. In some cases, the laryngeal disease follows more rapidly upon the affection of the throat, and, in a few, it seems almost cöetaneous with this affection. In these cases, especially, the inflammatory action extends not only to the trachea, but frequently also to the larger bronchi, as demonstrated by *post mortem* examinations, and as more fully shown in the article CROUP (§ 13. 35.).

65. *Consecutive sthenic laryngitis* is sometimes a complication of the more sthenic forms of scarlatina, measles, and small-pox, particularly in certain epidemics. But when it is thus complicated or associated, it generally assumes a less sthenic character, and approaches, in some cases at least, and especially in the constitutional affection, the *asthenic* or the next form to be noticed. In these associations the local affection varies considerably, particularly as respects the appearances of the albuminous exudation, which may be scanty, partial, or almost wanting. (See art. THROAT, *Diseases of.*)

66. *b. Asthenic Acute Laryngitis*. This may occur either as a *primary* and *simple* disease, or *consecutively* upon, or as a *complication* of, another malady. It is comparatively rare in its simple form; but it is one of the most frequent and fatal complications of eruptive fever. It sometimes also occurs in the course of other maladies, as will be shown hereafter.

67. *a. Simple Asthenic Laryngitis.— Œdema of the Glottis.— Œdème de la Glotte,* BAYLE.— In simple sthenic laryngitis there is generally more or less swelling of the margins of the larynx and epiglottis, owing to submucous infiltration of serum and lymph; but in the consecutive form, or that attended by albuminous exudation, such infiltration takes place to a much less extent, this exudation not merely mechanically obstructing the passage, but also irritating and producing spasm of the glottis. In the form of laryngitis now to be considered, the chief alteration which takes place is an infiltration of serum, and, in some instances, of a sero-puriform fluid, not only in the submucous cellular tissue, but also in the adjoining cellular tissue, or in that at the base of the epiglottis and surrounding parts. The disease commences with a continued and an increasing impediment to respiration, and with a feeling of

fulness and constriction in the larynx, and as if the passage was closed by some foreign body. The voice is at first hoarse, then sharp, stridulous, and hissing, and afterwards croupal or extinguished. There is a dry, hoarse, and convulsive cough, with fits of suffocation, causing the utmost agitation and distress. Whilst inspiration is prolonged and difficult, expiration is comparatively easy. Deglutition is not materially impeded, and pain, soreness, or tenderness in the laryngeal region, are not much complained of. In some instances, however, these are all more manifest, and considerable fulness or swelling is observed in the region and vicinity of the larynx. The constitutional symptoms are not acute or inflammatory, and fever may be slight or almost absent; but, as the disease advances, the pulse becomes weak, soft, small, quick, and irregular, and the system betrays imperfect aërification of the blood. In some cases, the attendant disorder is still more decidedly adynamic. The patient makes numerous efforts to expel from the larynx by forcible expirations matters which he feels to be a source of uneasiness and of obstruction, and to remove them by frequent attempts at deglutition. The fits of cough and suffocation generally terminate by expelling a little glairy mucus, which affords only slight relief. As the disease proceeds, the dyspnœa becomes more permanent, the fits of suffocation more frequent, and the cerebral functions disturbed. At last death takes place in the manner already described (§ 57.).

68. *β. Consecutive or Complicated Asthenic Laryngitis* occurs during the course of scarlatina, measles, small-pox, erysipelas, low or adynamic fevers, and of diffusive inflammation of the cellular substance of the throat. Most commonly the laryngeal affection is merely an extension of that of the throat, which commences in the tonsils and fauces, extending to the pharynx and larynx, and often also to the other passages connected with the pharynx. The local changes vary much with the nature of the primary malady, and state of the patient. In some cases, especially in those consequent on angina maligna, there is not only much diffused swelling of the parts, but also an exudation of soft dark lymph, which concretes imperfectly into crusts, or patches, and these irritate the larynx and epiglottis, especially when they become partially detached. Infiltration of the submucous cellular tissue, with swelling and softening, also takes place, the infiltrated fluid being either serous, sero-puriform, or sero-sanguinolent, or of a dark colour from the presence of blood-globules in it. The colour of the inflamed parts depends partly upon the character of the infiltrated fluid, upon the state of the lymph thrown out upon the diseased surface, and upon the grade of intensity or malignity marking the constitutional as well as the local malady. The affection of the throat, in these cases, particularly when it extends to the larynx, is attended by impaired vital cohesion of the mucous and submucous tissues, and by a soft or less tenacious state of the lymph, affused on the affected surface, which is, in some cases, membranous, but in others pultaceous, assuming a gangrenous-like appearance, from its colour and softness, and from the odour exhaled. In the more malignant cases, the crusts or patches of lymph become darker and more foul, owing to the exudation of dark blood, or of a bloody ichor from the inflamed surface, when they are being detached from it. In this form of the disease, the states of vascular action and tone, and the condition of the blood, which is always more or less altered, prevent the formation of a firm concretion on the inflamed surface, and give rise to the morbid and gangrenous-like exudations characterising it, as more fully shown in the articles SCARLET FEVER and THROAT.

69. When the larynx is consecutively affected in these asthenic or malignant cases, the progress of the disease generally is fatally accelerated. The breathing becomes laborious or convulsive; the inspiration difficult and prolonged; the voice croupal, whispering, or suppressed; cough frequent, suffocative, and harsh; the veins of the neck distended; the throat and laryngeal region tumid or swollen externally, and tender to the touch. In this state, sunken eyes, pallid countenance, dilatations of the nostrils, threatened suffocation, restlessness, anxiety, and distress, are rapidly followed by a leaden or livid countenance; by convulsions, especially in children, or by coma and death. In many of these cases, as well as in the more sthenic complications, the morbid action invades the trachea to a greater or less extent, but generally in a much slighter degree. (See art. CROUP, *Complications of*, § 18.)

70. C. CHRONIC LARYNGITIS.—*Phthisis Laryngea.*—Under this head have been comprised a number of chronic affections and alterations of the larynx, which are often associated with changes in either the epiglottis or the trachea, or even in both. These affections are frequently complicated still further with other maladies, especially with those of the lungs, and with chronic constitutional diseases. They may be — 1st, *primary, simple*, or the chief ailment; or 2d, *consecutive* and *symptomatic*. They are commonly inflammatory at their commencement; although the character of the inflammation may be either *catarrhal*, or *sthenic*, or *asthenic*, or *specific*.

71. *a. Primary and Simple Chronic Laryngitis.* — A comparatively *slight form of inflammation*, or rather a state of *catarrhal irritation*, may affect the mucous membrane of the larynx for several weeks, or even for many months, and produce merely hoarseness, a frequent husky cough, scanty mucous expectoration, and a sense of soreness at the top of the wind-pipe. This affection may be limited to the larynx, or be associated with relaxation of the uvula, or with indications of a similar irritation in the fauces, pharynx, and trachea. It is most common in persons exposed to cold and wet, and in the intemperate; and generally follows a neglected catarrh, or repeated catarrhal attacks. This form of chronic inflammatory action may exist for a considerable period without producing further change than thickening of the mucous membrane and submucous tissues; but it occasionally gives rise to further changes, especially to ulceration, to softening, to serous or sero-puriform infiltration, and several other lesions about to be noticed.

72. The more *severe states* of chronic laryngitis may commence in the above catarrhal form: they may even follow the acute attacks; but much more frequently they appear with hoarseness, and with a dry husky cough; and are considered as catarrhal only, until they are followed by disorganization and serious constitutional disturb-

ance. They are thus insidious, not only in their *primary* and *simple forms*, but also, as will be noticed hereafter, in their *consecutive* and *complicated states*. The *symptoms* which require the closest observations are those connected with the voice, the cough, the respiration, the sensibility of the part, the physical signs referable to the chest, and the expectoration. — The *voice* is variously altered. At first, the defect of the voice is apparent only when speaking loud, or when varying the tone; but it generally becomes more and more cracked, until its healthy tone is quite lost. Hoarseness is then always present, and is, in the more catarrhal and slight cases, loose, mucous, and deep; but, in the more severe and prolonged instances, it is commonly stridulous, dry, and squeaking, or whispering. In the worst attacks, it is more and more affected until it is altogether lost.—The *cough* is, in the early stages, short, dry, and hacking; but, in the latter stages, and when the glottis is incapable of being closed, it is loose, continuous, and hawking or peculiar, as noticed by MM. TROUSSEAU and BELLOC.—The *respiration* is usually affected sooner or later in the course of the malady. Difficulty of breathing frequently occurs in the night, and on any physical exertion, and is characterised by spasm of the glottis. In proportion to the mechanical impediment to the passage of air, and to the degree of œdema of the glottis attending the disease, are the dyspnœa and the hissing and stridulous noises on respiration increased. After the dyspnœa becomes permanent, or amounts to orthopnœa, death generally takes place in fifteen or twenty days. — The *sensibility* of the larynx is seldom very acutely affected, although it is always slightly increased. In one half the cases, pain is not much complained of: still it is felt, with a sense of soreness or tenderness, when the larynx is handled or pressed, or rubbed against the spine. The morbid sensibility of it is evinced chiefly by the effect of cold air upon it, and by the readiness with which cough is excited by this or by other causes.

73. The *expectoration* is at first scanty and mucous; but, as the disease advances to disorganization, or becomes more intense or acute, it is muco-puriform, sanious, or streaked with blood, or even fœtid; occasionally it is adhesive and ropy. Purulent expectoration sometimes relieves the difficulty of breathing; and when this is observed in connection with pain and soreness in coughing, and with hoarseness or loss of voice, *ulceration* may be inferred to have taken place. As the ulceration and disorganization proceed, dead or ossified portions of the arytenoid and cricoid cartilages, or calcareous substances formed in the larynx, are sometimes expectorated, and more rarely they fall into the trachea and pass into the bronchi, causing irritation, and consequent inflammation in the parts where they lodge.

74. *Difficulty of swallowing* is occasionally felt, particularly when the epiglottis is more or less implicated, or when irritation extends to the pharynx. In these, paroxysms of cough and suffocation are induced by the attempts at deglutition, and by portions of the substances taken passing into the glottis.—The *physical signs* indicating either the exemption of the bronchi and lungs from disease, or the existence of disease also in these parts, are much obscured by the impediment to the circulation of air through the larynx; and more dependence may generally be placed upon percussion than upon the respiratory murmurs in evincing this exemption. At almost any period of the progress of chronic laryngitis an *acute state* of inflammatory action may occur, generally with more or less œdema, or sero-mucous infiltration of the submucous tissues, and terminate the life of the patient in a very short period: and this may take place almost at any stage of the disease, either previously or subsequent to ulceration. In *simple* or *idiopathic chronic laryngitis*, death is occasioned either by this occurrence or by the paroxysms of orthopnœa, caused by spasm in addition to œdema, by disease of the cartilages and other lesions, or by the suffocative paroxysms induced by the passage of matters into the diseased larynx.

75. *b.* The *Complicated* and *Consecutive States of Chronic Laryngitis* are very much more common than the primary and simple. The most frequent of these complications is that with tubercular phthisis. M. LOUIS has remarked that upwards of one fourth of the cases of this malady were complicated with chronic laryngitis, this latter being the consecutive affection. It may also be associated with chronic tracheitis, with ulceration in the trachea and large bronchi, and with chronic inflammation of the pharynx; but the association is rarely thus limited, being generally extended also to the lungs. When chronic laryngitis extends to the trachea, or when chronic tracheitis extends to the larynx, and *Laryngo-tracheitis* is thus present in a chronic form, tenderness and soreness are often felt in the course of the trachea; and, in some instances, I have observed great swelling of the throat along the whole tube; but in all these the lungs were also diseased. This swelling in the course of the trachea arises from the existence of ulceration in the internal surface of the tube, and from the œdema or infiltration of the cellular tissue external to the cartilaginous rings.

76. The *epiglottis* may be inflamed and ulcerated without the larynx itself being materially affected, although the epiglottis is often implicated when the larynx is diseased. M. LOUIS states, that of eighteen cases of *inflammation* and *ulceration* of *the epiglottis*, the larynx and trachea were free from disease in six. Of these latter, pain, more or less severe, was felt by four in the superior part of the thyroid cartilage, or between this cartilage and the os hyoides. The pain was compared to that of a sore, to a pricking sensation, or to a heat of the part. In some cases it had lasted a month or two, but in others it had occurred but a few days before death. In these cases, although the pharynx was healthy, deglutition was difficult, fluids sometimes being thrown back through the nose. The twelve patients who had ulcerations at once in the epiglottis, larynx, and trachea, complained of dysphagia, pain, and occasionally regurgitation of fluids by the nose.

77. It has been shown that *simple chronic laryngitis* is generally attended by great mechanical obstruction and stridulous breathing; but when the laryngeal affection is consequent upon, or complicated with, *pulmonary disease*, the obstruction in the larynx is commonly much less, and stridulous breathing is hardly remarked. This is owing to the circumstance of primary chronic laryngitis giving

rise to more œdema, or infiltration of the submucous tissues, than laryngitis consecutive upon pulmonary tubercles. In this latter the inflammatory irritation and the consequent ulceration is more superficial and less obstructive to respiration than the former. In both acute and chronic laryngitis, the vesicular murmur becomes feeble in proportion to the obstruction, as shown first by Dr. GRAVES and Dr. STOKES; and, in severe cases, it can hardly be perceived, the feebleness or absence of this murmur being equal in all parts of the chest. In order to ascertain the presence of lesions of the lungs in cases of chronic laryngitis, more reliance may be placed on percussion than on the stethoscope. Where the mechanical obstruction is but slight, as Dr. STOKES remarks, this instrument may be used with exactness; but even in cases where the lung is fully and freely inflated, it will occasionally be next to impossible to determine whether the symptoms proceed from laryngeal disease alone, or from its complication with an affection of the lung.

78. The principal fact to be kept in recollection in cases of chronic laryngitis, is the very frequent association of pulmonary disease with it, even when the larynx has been the part seemingly first attacked. There is no doubt that chronic laryngitis is in some cases first developed, and that the lungs become secondarily affected, particularly where a predisposition to pulmonary disease exists; and in these especially the susceptibility of the larynx to causes of irritation is much increased; but both maladies may commence simultaneously, and even proceed *pari passu*, that of the larynx only being manifest, owing to the nature of its organization; and thus the pulmonary disease may seem to be consecutive, even whilst it is coëtaneous with the laryngeal, or even primary. The obscuration of the physical signs of pulmonary diseases by laryngeal affections is so great, that the former are generally masked by the latter from those who trust chiefly to these signs, to the neglect of those physiological and rational phenomena which generally accompany even the early stages of pulmonary consumption, and in which the closely observing physician confides more surely than in the proofs furnished by the stethoscope. It is only in the far advanced stages of pulmonary tubercles, that the physical signs are manifested, when they are complicated with chronic laryngitis, as shewn hereafter (§ 86). It may, however, be concluded, that where there are laryngeal cough, muco-purulent or purulent expectoration, hoarseness or aphonia, semi-stridulous respiration, emaciation, and hectic fever, pulmonary tubercles exist in advanced stages, whether they are indicated by the physical signs or not; and this inference is strengthened by the occurrence of night perspirations, irritability of the bowels, incurvation of the finger-nails, and various other symptoms.

79. *c. Syphilitic Chronic Laryngitis.* — Chronic laryngitis sometimes occurs in the course of *secondary syphilis*, and it then assumes a specific form, soon passes into ulceration, the ulceration apparently extending from the tonsils and pharynx by continuity of surface to the laryngeal mucous membrane. Hence syphilitic chronic laryngitis is almost always associated with syphilitic inflammation of the tonsils, fauces, and pharynx. Mr. CARMICHAEL considers venereal ulceration of the larynx as the consequence of the *phagadenic* venereal disease; and he believes that the ulceration always propagates itself at its edges by continuity of surface from the fauces to the pharynx and thence to the larynx.

80. ii. APPEARANCES AFTER DEATH. — *A. In the acute forms of laryngitis*, the lesions observed on dissection vary with the character and complications of the disease. — *a.* In the *sthenic* and *simple forms* the mucous and submucous tissues of the larynx are not only red and injected, but also swollen or thickened; and these appearances may be confined chiefly to the larynx, or extended to the upper part of the *trachea*. The *epiglottis* is very red, injected, thickened, or swollen and erect. The folds of the glottis, and the cellular tissue extending from the epiglottis to the glottis, are red and swollen from infiltration of serous lymph, or even of pure lymph, patches of which are sometimes found on the mucous surface of the larynx, and the inferior surface of the epiglottis. In cases which have not proved very rapidly fatal, a sero-puriform fluid, or even pus, escapes when these parts are divided. Ulceration is more rarely observed. — In the *complicated state* of sthenic laryngitis, or when the disease has been consequent upon inflammation of the throat, with albuminous exudations — or upon angina membranacea — a more or less complete and consistent coating of albuminous lymph is found in the pharynx, the larynx, and to a greater or less extent along the trachea; and often, in some degree, also in the large bronchi. The exudation, however, is either scantier, or consists of a tenacious or semi-consistent matter in the lower part of the trachea and in the bronchi. Occasionally the false membrane formed in the larynx seems to have been partially detached, and is loose and ragged, or is altogether removed. The mucous membrane and submucous tissues are red and injected, and frequently also more or less swollen.

81. *b.* The *asthenic form* of laryngitis is attended by a serous infiltration of the submucous cellular tissues, causing great œdema and swelling of the parts, the mucous membrane itself being but slightly injected. In some cases, the folds of the glottis are so infiltrated with serous or sero-puriform fluid as nearly to close its aperture. In many of these, the epiglottis is but slightly altered, but, in others, the part close below or at the root of the epiglottis and at the anterior and upper part of the larynx are most infiltrated, the former being in some instances separated from the latter by the effusion in this situation. — In the *complicated states* of asthenic laryngitis, particularly in the associations with scarlet fever, measles, small pox, erysipelas, or with diffusive inflammation of the cellular tissue in the vicinity, the submucous tissues of the larynx and epiglottis are often infiltrated with a dirty, sero-puriform matter, or with a foul serum and lymph, which fills the ventricles and surrounds the vocal ligaments, and sometimes extends to the cellular tissue at the root of the tongue and external to the larynx, and even to the adjoining parts. In these more malignant cases, all the tissues are more or less softened and discoloured; and the alterations frequently extend to the pharynx and fauces on the one hand, and to the trachea on the other.

82. *B.* In *chronic laryngitis* the structural lesions are numerous: — 1. The mucous mem-

brane is red in patches, and exhibits a granular appearance, even when it is not ulcerated, owing to enlargement of its follicles: it is also apparently thickened, but this change is seated chiefly in the submucous cellular tissue, and causes enlargement and imperfect mobility of the parts, with partial obliteration or linear contraction of the ventricles of the larynx. — 2. Serous, puriform, or tuberculous infiltrations of the cellular tissue, and of the internal laryngeal muscles, either with or without softening and atrophy of these muscles and of the ligaments, are often observed. — 3. Wasting and fibrous degeneration of the muscles which move the cartilages of the larynx, and contractions of the ligaments, are frequently met with. These lesions account for the loss of voice in this disease. — 4. Purulent collections, or small abscesses in the submucous cellular tissue, particularly in the ventricles and around the cricoid cartilage, are seen in a few cases. — 5. Ulcerations of the mucous and submucous cellular tissues occur in various forms and situations, and are amongst the most frequent lesions in chronic laryngitis. The ulcers sometimes are small and round, and penetrate only the mucous membrane; occasionally they are large, irregular, and superficial, with purulent secretion on their surfaces. In some instances they are still more extensive, and, in the syphilitic laryngitis, accompanied with warty excrescences. Ulcers are not infrequently found in the ventricles, particularly in cases of phthisis, and are either rounded and superficial, or deep and irregular. The arytenoid and even portions of the other cartilages are occasionally destroyed by ulceration, but chiefly in young subjects. In most instances, and in older persons, ossification takes place in the cartilages before the ulceration reaches them. Ulcers are most commonly seen between the vocal chords and the epiglottis, but they are often found in other parts of the larynx, and in the laryngeal surface and edges of the epiglottis, and more rarely at the lower part of the larynx and commencement of the trachea. — 6. In some cases, ulcerations varying in size, form, and depth, are found in the *trachea*, especially its upper part; and in one instance I found a fistulous opening into the œsophagus. The ulcers are chiefly in the musculo-membranous portion, especially when the affection of the larynx and trachea is consequent upon disease of the lungs. — 7. Ossification of the cartilages is generally observed in the more prolonged cases. The osseous matter is irregularly deposited, generally on the surface of the cartilages. The cricoid and thyroid cartilages become naturally ossified in advanced life; but MM. TROUSSEAU and BELLOC have shown that chronic laryngitis of two years' duration produces the same change in young persons, irritation accelerating those changes to which the tissues are naturally liable in the course of time. 8, Instances of *necrosis* of the arytenoid, cricoid, and even of the thyroid cartilages have been recorded by LAWRENCE, PORTER, CRUVEILHIER, OTTO, RYLAND, ANDRAL, and others. MM. TROUSSEAU and BELLOC found this lesion in more than one-half of the cases of laryngeal phthisis which they examined. They describe the cartilages to be denuded of their perichondrium, and of a dull dirty hue. The sequestrum of dead cartilage is not readily thrown off, and the cellular tissue adjoining it is generally infiltrated with a fetid pus. These purulent collections often open and discharge their contents, sometimes with dead portions of the cartilages, or with ossific deposits, or with carious portions of the ossified cartilages. The opening and discharge of these matters usually take place in the larynx, but in rare instances they have occurred into the œsophagus, or outwardly through the integuments of the neck in still rarer cases. These mortified portions of the cartilages, as well as carious portions of the ossified cartilages, and phosphatic concretions in the diseased larynx, are sometimes discharged without any preceding or attendant abscess, and merely as a consequence of ulceration. When their escape from the larynx is impeded or attended by much spasm, or when they cause much irritation on being detached, they act as foreign bodies, and occasionally produce suffocation. They may even fall into the trachea, and produce effects such as are mentioned when treating of *foreign bodies in the larynx and trachea.* — 9. The *epiglottis* is often enlarged, thickened, or swollen: frequently, also, it is ulcerated, chiefly however in the inferior surface, and at the edges, in connexion with ulceration of the larynx and disease of the lungs. In the syphilitic form of the disease, the ulceration extends from the lingual to the laryngeal surface, and sometimes destroys the whole of the epiglottis. In less common cases, it is contracted and shrivelled, and more rarely expanded and thinned.—10. Besides the above, cauliform vegetations, warty excrescences, tubercles, and more rarely cancer and hydatids of the larynx have been remarked, and some of these lesions have been seen extending to the epiglottis.—11. The *trachea* has been observed to contain morbid secretions proceeding from ulceration of its internal surface, or from disease of the bronchi or lungs. It is sometimes remarkably thickened from deposition of lymph in the submucous cellular tissue, and in a few instances a similar deposition is observed in the cellular tissue external to the cartilaginous rings. Redness and injection of the internal surface of the trachea, and ulceration as above mentioned, are commonly associated with tubercular excavations in the lungs, and are most frequently observed in its posterior or membranous part. In some cases, these changes, ulceration particularly, are confined to, or most remarkable on one side of the trachea, which invariably corresponds to the diseased lung; or, if both lungs be diseased, to that most affected.—12. In a remarkable instance which occurred to my friend Mr. WORTHINGTON, of Lowestoft, several of the rings of the trachea were absorbed, and in consequence of the fibrous structure being deprived of its antagonising power at that part, the canal was constricted so remarkably as hardly to admit a quill, and as to suffocate the patient.—13. *Tumours* of various kinds, *abscesses, aneurisms,* &c. have been found pressing upon the trachea, and even on the larynx, and causing not only permanent obstruction to respiration and spasm of the glottis, but also morbid secretions from the internal surface of these passages, and partial destruction or perforation of their parietes.

83. The lesions just described, will, in the various stages and grades of their developement, sufficiently explain the phenomena of acute and chronic laryngitis. When infiltration of the sub-mucous cellular tissue, obstructs the passage of air into the

lungs, or when the exudation of albuminous lymph upon the surface of the larynx, produces the same effect, respiration, voice, and speech, are more or less impeded, and the various morbid phenomena connected with these functions are developed. When a thickened granular, or superficially ulcerated state of the mucous membrane of the larynx is present, the muscles and ligaments being uninjured, and the mobility of the parts of the vocal apparatus is not materially affected, by infiltration of fluids or other lesions, respiration is not impeded, but hoarseness, and alteration of the tone of voice are present. When the muscles and ligaments are diseased, and when the subordinate parts of the apparatus are incapable of the requisite motions, aphonia is more or less complete.

84. iii. DIAGNOSIS.—A. *Of the Acute.* The stridulous hissing and difficult breathing; the prolonged inspiration, the larynx being always drawn downwards most forcibly during the act, as first pointed out by me in the article CROUP, and the reference made by the patient to the top of the windpipe as the source of his distress, are sufficiently distinctive of the nature of the disease.—*Abscesses* in the vicinity of the larynx may be mistaken for acute laryngitis; but examination of the upper part of the throat, and the partial or general swelling and tenderness observed externally, the confined motion of the larynx, particularly from side to side, and the difficulty of moving the jaw, will indicate the nature of the affection.—*Spasm of the glottis* may be mistaken for laryngitis; but it rarely affects adults, and only hysterical persons. In these, however, a slight form of laryngitis, as that sometimes consequent upon cold and common sore throat, is often attended by severe accessions of spasm, and may be erroneously viewed as hysterical spasm of the glottis merely. I have met with several instances of this *association of inflammatory and nervous affections of the larynx*, and the importance of recognising their exact nature has been made apparent in all of them. The previous catarrh, or sore throat, the existence of fever, the symptoms referrible to the larynx, especially the stridulous breathing, the hoarseness or aphonia, and the mere exasperation of the suffocative feelings by the nervous or hysterical state of the patient, will indicate the association here contended for; and which consists of a slight form of acute laryngitis presenting violent exacerbations owing to the nervous temperament of the patient.

85. It has been remarked above (§ 59.) that laryngitis is sometimes *complicated* with tracheitis, the complication taking place in *two* or perhaps *three* ways: — 1st. The inflammation may advance upwards from the trachea to the larynx. 2nd. It may extend from the pharynx to the larynx and trachea. 3rd. It may attack both the larynx and the trachea at nearly the same time. In cases of *primary* or *sporadic croup*, the inflammation appears in either the first or the third of these modes, and is generally at the commencement, or at an early period of its course, a *Laryngo-tracheitis* often extending, at an advanced stage, to the large bronchi, as shown in the article CROUP. On the other hand, that complication of *laryngitis* which is *consecutive* of or *complicated* with *pharyngitis*, and which has been called "croup in the adult," "secondary croup," "epidemic croup," &c., commences and extends always in the second of these modes. Between these two kinds of *croup* as they have been denominated by several writers, or rather between these forms of *complicated acute laryngitis*, as I have termed them, the distinctions are of great practical importance. Yet they have not been made with sufficient precision. Dr. STOKES has pointed out many of the most important of them, but as some of them have not been considered by him with reference to the characters of certain epidemics, I shall modify a few of the distinctions he has adduced.

Distinctions between the chief Forms of complicated Laryngitis.

Tracheo-Laryngitis, *or* *Primary Croup.*	*Pharyngo-Laryngitis,* *or* *Secondary Croup.*
1. The wind-pipe first attacked.	1. The laryngeal affection consecutive of disease of the pharynx and fauces.
2. The local disease the chief cause of the attendant fever. The fever symptomatic.	2. The local disease occurring in the course generally of a constitutional, and most commonly of a febrile malady.
3. The fever inflammatory.	3. The fever sub-inflammatory, adynamic, or malignant.
4. Children principally attacked.	4. Both adults and children attacked.
5. The disease sporadic, and in certain situations endemic; but never infectious.	5. The malady frequently epidemic, and generally infectious.
6. The exudation of lymph spreading, from the trachea to the glottis, or from below upwards.	6. The inflammation, and the exudation attending it, spreading from the throat, or from above downwards.
7. The pharynx healthy.	7. The pharynx diseased.
8. Dysphagia either absent or very slight.	8. Dysphagia common and severe.
9. Catarrhal symptoms often precursory to the laryngeal.	9. Laryngeal symptoms occurring without the pre-existence of catarrh.
10. Complication, with bronchial or pulmonary inflammation, frequent.	10. Complications with these diseases rare.
11. Absence of any characteristic odour of the breath.	11. The breath often characteristically fœtid.
12. Necessity for antiphlogistic treatment, and the frequent success of it.	12. Antiphlogistic treatment very rarely requisite. Restorative, tonic, stimulating, and other remedies necessary.

86. *B. Diagnosis of Chronic Laryngitis.* — A peculiar laryngeal cough, a permanent change in the voice, difficult and sibillous breathing, and pain or tenderness in the larynx, generally characterise chronic laryngitis. But difficulty of breathing and pain may be wanting in the early stages of the disease, or may occur only occasionally in the advanced periods. When the laryngeal swelling or constriction is considerable, the difficulty of respiring, and the peculiar sound attending it, are sufficiently indicative of the disease; and, when these are wanting, the stethoscope will detect, as Dr. STOKES has shown, a harshness in the sound of the air passing through the larynx, suggesting the idea of a roughness of surface. When the laryngeal constriction and the laryngeal respiration are slight or altogether absent, disease of the larynx may yet be inferred as the cause of the cough and other symptoms by the negative indications of the thoracic organs, the sounds of percussion and of respiration being good throughout the chest. In abscess and mortification of the cartilages of the larynx there are laryngeal cough, fœtid purulent expectoration and

even hectic, and there may be no disease in the chest; but these cases differ from ordinary phthisis laryngea, particularly in the prominence and rapidity of the purely laryngeal symptoms. The difficulty of determining the complication of the disease with pulmonary tubercles in their earlier stages, or true phthisis laryngea, should lead to a careful investigation of the history of the case, with the view of ascertaining whether the laryngeal affection was primary or whether it supervened upon disease of the lungs. If it be found that the first symptoms were sore throat, relaxed uvula, difficulty of swallowing, and were followed by those of a laryngeal character, or that a syphylitic taint had existed, there is a great probability that the first morbid action was manifested in the larynx, and that the lungs were unaffected. But if, on the other hand, as Dr. STOKES observes, it is ascertained, that previously to any hoarseness, stridor, or dysphagia, there has been cough without the laryngeal character, particularly if it was at first dry; that the breath has been short, that there has been pain in the chest about the collar-bones or shoulders; that hœmoptysis has occurred; that hectic has been observed, although the expectoration continued mucous; and that the patient has emaciated, it is almost certain that the case is in reality one of pulmonary tubercles, in the course of which laryngeal disease has occurred. If, moreover, the patient is of a scrofulous diathesis, or has already lost brothers, sisters, or a parent, by tubercular disease, we may be certain that this is the nature of the case, although we can detect no physical sign of pulmonary tubercles. In examining such cases, a careful comparison of the sounds emitted on percussion by corresponding opposite portions of the chest; and an investigation by successive investigations or at different periods, will show the state of the disease. If, co-existent with laryngeal cough, muco-purulent expectoration, semi-stridulous breathing, and hectic, we find a notable difference between the sounds of opposite corresponding portions of the chest, there is almost sufficient evidence of tubercular disease of the lungs. When there is copious muco-purulent expectoration of considerable continuance, we may infer the existence of suppurating tuberculous cavities in the lungs. When there are dullness on percussion or cavernous rhonchus in some part of the chest, particularly under a clavicle or scapular ridge, with copious expectoration, night sweats, emaciation, &c., an advanced period of the tubercular disease is present.

87. iv. PROGNOSIS.—*A. In acute Laryngitis* the prognosis is considered more unfavourable than in any other inflammatory disease by Drs. CHEYNE, BAYLE, and others. Mr. BAYLE states that of seventeen cases observed by him during six years, only one recovered; but this is much below the average recoveries. Mr. RYLAND refers to twenty-eight cases treated by different practitioners, and of these ten recovered; but he believes that this proportion conveys too favourable a view of the usual termination of the disease, a greater number of successful than of fatal cases having been recorded. There can be no doubt of the correctness of the opinion given by Dr. WILLIAMS, that the prognosis should be very unfavourable, and the more so, the more progressive the difficulty of breathing. When the face becomes pallid and subsequently livid and the patient lethargic, the danger is extreme. The *complicated* and *asthenic forms* of acute laryngitis are especially fatal, particularly when they occur in an advanced stage of exanthematous, or epidemic, or malignant diseases. Hopes of recovery may be entertained in the milder forms or states of the malady, and when the breathing becomes less difficult, and is attended by a freer expectoration. The slight catarrhal form is merely a state of catarrhal irritation of the glottis, to which no risk is attached, unless it pass into the acute or chronic inflammatory states. Mr. RYLAND found that of the eighteen cases which terminated fatally, death occurred within the first twenty-four hours in four, on the second day in one, on the third day in four, on the fourth day in five, on the fifth day in one, on the sixth day in one, and on the eighth day in two instances.

88. *B. The prognosis of chronic laryngitis* entirely depends upon the states in which it is presented to our observation. In its *simple* and *mild forms*, a favourable yet cautious opinion may be given; for although they will generally yield to judicious treatment, exacerbations, œdema, or even ulceration, may take place. If, however, even these forms occur in a faulty or scrofulous constitution, a much more unfavourable opinion should be formed of the result. If, however, the disease has continued for any time; if it have not been amenable to treatment; if the expectoration has become abundant; and especially if the history and existing state of the case, and the presence of the symptoms noticed above (§ 86.), indicate its connection with pulmonary disease, a most unfavourable result may with certainty be anticipated. Fœtor of the breath and sputa indicate mortification of the cartilages, and is very unfavourable; but in simple laryngitis there is still a chance of the dead portions being thrown off, but there is no chance of laryngeal disease being cured when it is dependent upon tubercular excavations in the lungs. In the *syphilitic form* of chronic laryngitis, if the general health has not suffered much, and if the lungs be sound, the patient may recover; but the chances will depend entirely upon the degree of local lesion and the general state of the frame.

89. v. CAUSES. — *A. Acute Laryngitis* may directly follow exposure to cold, wet, and currents of air, continued or very great exertion of the voice, and accidental attempts to swallow acrid, corrosive, or scalding fluids. Mr. PORTER observes, that when a person attempts to drink any of these by mistake, a convulsive action of the pharynx and upper portion of the œsophagus takes place, and throws the offending fluid out through the mouth and nostrils, under the epiglottis, thus irritating and inflaming this part and the rima glottidis. Drinking boiling water in mistake by children who have been accustomed to drink from the mouth of a tea-pot, as in the cases recorded by Dr. M. HALL; the inhalation of very hot air, or of flame, as in some cases of burning as shown by Mr. RYLAND; and the inhalation of very acrid vapours, as the strong fumes of ammonia, or of iodine, or the chlorine gases, &c.; are also exciting causes of the disease. I attended a case many years ago with a practitioner, which was caused by swallowing a large quantity of mustard, in order to produce an emetic effect after poisoning from opium. The man recovered. In the *consecutive* or *secondary forms* above described

(§ 63.) the disease occurs in the course of *cynanche tonsillaris*, of *C. Pharyngea*, and of *C. Parotidæa*; and in a decidedly asthenic form, in the course of scarlet fever, measles, small-pox, erysipelas, and typhoid fevers. It may be consequent even upon glossitis, and diffusive inflammation of the cellular tissue of the neck or throat. Mr. LAWRENCE and Dr. WILLIAMS have met with it in the course of aneurism in the arch of the aorta. Acute laryngitis also may supervene at any stage of the chronic state of the disease.

90. The circumstances more especially *predisposing* to an attack, are frequent or habitual occurrences of sore throat; indigestion connected with biliary disorder, or with accumulations of bile in the biliary organs, and of morbid secretions in the alimentary canal; habitual intemperance, either in eating or drinking; particularly the latter; severe or prolonged courses of mercury, and unusual exertions of the voice. When inflammations of any kind attack the throat, or parts adjoining, their extension to the larynx is favoured by accumulations of morbid secretions and excretions in the abdominal viscera, and by depressed states of the powers of life, — a fact of great practical importance, and hitherto insufficiently attended to both in our pathological reasoning and in our therapeutical indications.

91. *B. Chronic laryngitis* may arise from the same *causes* as have been now enumerated; but it sometimes succeeds the acute disease, and much more commonly it follows the frequent recurrence, or neglect, of the slight or catarrhal state of irritation mentioned above (§ 52.). — Great or prolonged exertions of the voice, particularly by those addicted to the use of spirituous liquors, and the combination of neglected catarrh with intemperance, are the most common causes. Mercurial courses, the extension of syphilitic ulcers from the throat, dust or grosser foreign bodies inhaled or passing into the larynx, and injuries of the throat, also sometimes occasion chronic laryngitis. Persons of a scrofulous diathesis, — those liable to cutaneous eruptions, or who have been suffering for a long time the more severe forms of indigestion, particularly cardialgia with acrid eructations, and all disposed to, or already affected by, tubercular disease of the lungs, are especially *predisposed* to this affection. Its dependence upon pulmonary consumption is most frequent and intimate. It is most common at the middle period of life, or probably somewhat earlier, at least according to my experience; and is nearly equally frequent in both sexes. MM. TROUSSEAU and BELLOC think that it affects males oftener than females; Mr. RYLAND that it more frequently attacks the males.

92. vi. TREATMENT. — *A*. In the *acute sthenic laryngitis*, particularly in its *primary* and *uncomplicated* form, the treatment should be prompt, early, and decided, in order to arrest the disease before effusion, in any form, or in any situation, takes place. The necessity for having a very early recourse to treatment is shown by the rapid fatality of some cases (§ 58.). — The *intentions* with which remedial means should be prescribed are — 1st. To reduce inflammatory action, and thereby to prevent or arrest those consequences of it usually productive of a fatal issue; — 2nd. If effusion, or infiltration of the laryngeal tissues have taken place so as most dangerously to obstruct respiration, to obviate such obstruction and its consequences; — 3rd. To promote the removal of such lesions as have taken place.

93. *a*. The *first intention* involves a recourse to *bloodletting*; but a cure of the disease is not to be expected from this means alone, although it should be instantly and decidedly employed, and in the manner advised by me in the article BLOOD (§ 64.), so as to make a decided impression on the pulse without producing syncope, and within the first twelve or twenty-four hours from the accession of the disease. After effusion or infiltration has taken place, so as to interfere with the purposes of respiration, bloodletting will be then too late to be of any service. A repetition of the bloodletting, and the quantity of blood taken, must depend upon the severity of the disease, the habit and constitution of the patient, and the effect produced by it. *Cupping* on the nape of the neck, after the first or second venæsection, should not be neglected. By its means a very large or small, but always a definite quantity of blood may be taken, and with a derivative effect. A recourse to leeches is seldom so satisfactory as to cupping, in this disease. After the first blood-letting, a full dose of calomel — five or six grains, with three or four of JAMES's powder, and a third of a grain of opium, as advised by Dr. CHEYNE, should be given every third, fourth, or fifth hour, until the gums become affected. I have never seen any benefit derived from the application of blisters; and I am sure that I have seen them injurious. Dr. CHEYNE properly objects to them. A recourse to strong liquor ammoniæ, as suggested by Dr. J. JOHNSON, may be preferable; still it acts only as a vesicant; and, when applied over the throat, it is so near the seat of inflammatory action, as to excite its activity rather than to diminish it by derivation. ROMBERG, CAMPBELL, and others, advise the croton oil to be externally applied, but it is more appropriate in the chronic form of laryngitis.

94. For more than twenty years I have had recourse, immediately after blood-letting and the first dose of medicine, to the application of flannel, wrung out of hot water and freely sprinkled with spirits of turpentine, or with a combination of this substance with camphor, or with compound camphor liniment, around the whole neck and throat. This application, when duly managed and modified as respects its continuance and the combination of substances used, is the most efficient remedy in all the forms, simple and complicated, of acute laryngitis; and, as it does not vesicate, or at least very slightly, it is not in the way of the operation of tracheotomy, which will rarely be necessary when it has been early resorted to. It has a remarkable effect in restraining inflammatory action in parts near those to which it is applied, and in preventing and arresting the effusions and infiltrations consequent on inflammation. The success of this application will entirely depend upon the decision with which it is employed. Dr. CHEYNE objects to the use of tartar emetic in any way, lest it should excite vomiting, and by throwing matters against the erect and exposed epiglottis, and cause violent convulsive irritation; and Dr. WILLIAMS, for a similar reason, argues against the propriety of applying leeches on the tonsils, as proposed by Dr. CHEYNE and Mr. CRAMPTON. The irritation of

the bites, and of the blood proceeding from them, can hardly be supposed to be otherwise than injurious. The above measures may, although early resorted to, only delay the unfavourable progress of the disease — may fail in arresting the inflammation, and in preventing its consequences from dangerously or even fatally obstructing respiration. It is now that the *second* intention must be adopted; but the *third* should not be neglected from the commencement; for the removal of the lesions, or consequences of inflammation already produced, should be attempted forthwith; and the means best calculated to attain that end are also those best adapted to fulfil the first indication, more especially the free use of mercury, and the application of the embrocation, already mentioned around the neck.

95. *b.* The *second intention* must be resorted to as soon as the lesions consequent upon inflammation begin to obstruct respiration, so far as to prevent the necessary changes from taking place in the blood. If the strength fail, and pallor with lividity of the lips appear, blood-letting and the other means advised above will be of no avail, and *tracheotomy* is then indispensable. It may have been even too long delayed; for it should be performed before the blood is altered so far by the obstruction to respiration as to change its sensible qualities. Dr. CHEYNE justly remarks that if the symptoms be such as to contra-indicate blood-letting, and yet asphyxia is imminent, the operation should be instantly performed. As long as the complexion is good, and asphyxia not threatened, it may be delayed. Mr. LAWRENCE says that it should be resorted to as soon as the symptoms enable us to ascertain the nature of the disease; and, although this may be too precipitate a recourse to a surgical operation in itself and consequences not without some risk, it is preferable to delaying it too long. The effect of treatment, particularly of blood-letting and of the application around the throat, which I have advised, should be first observed; and if these do not give relief in a period varying from twelve to twenty-four hours, according to the urgency and peculiarities of the case, tracheotomy should be resorted to. But no precise time ought to be assigned before the operation is performed; for the local symptoms, and the states of the vital functions caused by the laryngeal obstructions, should alone guide both physician and surgeon in respect of it. There are pathological circumstances connected with too prolonged a delay of the operation which should not be overlooked, as they are the most powerful arguments against such delay. These are the increased disposition to bronchial and pulmonary congestion with obstruction to the respiratory function, and with interrupted change of the venous into arterial blood; and the fact that these changes, when they reach a certain pitch, often lead to fatal results, although the obstruction to respiration may have been removed previously to the occurrence of any immediate risk of asphyxia. Still the operation may be tried even when asphyxia approaches, as a few instances have occurred of its success at the last extremity; but the engorged state of the lungs and congestion of the bronchial surfaces, which increase with the progress of the local obstruction, generally pass into effusion or into an asthenic state of inflammatory action, when the respiratory actions are restored by the operation after having been too long delayed. An early recourse to the operation is particularly indicated when laryngitis has been caused by swallowing acrid or corrosive or boiling fluids, as the means of cure recommended do not act so rapidly in these cases as in many others, and an early opening into the trachea facilitates the treatment of the injured parts.

96. After the operation, care should be taken not to insert too long a tube into the windpipe, as such an one will excite serious irritation; and equal care should be observed that expectoration be not prevented by constantly expiring through this tube, otherwise the accumulation of mucous or muco-puriform matter in the trachea and bronchi will prevent all benefit from accruing from this measure. The tube, therefore, should frequently be closed after a full inspiration, and the patient be told to expire forcibly through the glottis, so as thereby forcibly to expel the accumulating matter. Until the obstruction in the glottis is removed by the mercurial treatment, which should be persisted in until its effects become manifest, active counter-irritants should be applied on the chest or between the shoulders, and the most efficient of these are terebinthinate embrocations and blisters. These, and a recourse to cupping, or to dry-cupping on the chest, according to circumstances, will diminish or remove the congestion of the bronchial surfaces and lungs, and the disposition to inflammatory action in these parts, which often destroy patients after tracheotomy had apparently for a time saved them, and which generally arise in the manner just stated, and less frequently are propagated along the respiratory passages as the disease proceeds and the powers of life are reduced.

97. *B. The complicated forms* of sthenic laryngitis require a different treatment from that advised in the simple sthenic form. In that *complication* which is consequent upon, or coëtaneous with, *tracheitis*, and which constitutes a very large proportion of the cases of CROUP, nothing can be added at this place to what has been fully adduced in that article, from a tolerably extensive experience. When laryngitis occurs from the extension of inflammation with albuminous exudation from the fauces and pharynx — is *consequent upon angina membranacea* — and when the local and constitutional symptoms indicate a more or less sthenic disease, the treatment should be such as may subdue increased vascular action, and be especially and early directed to the state of the fauces and pharynx, in order to prevent the extension of the morbid action from them to the larynx. The means most beneficial in this form of disease are fully described in the article THROAT — *diseases of*. When the larynx becomes implicated, a vigorous recourse to calomel, and the application of the terebinthinate embrocation around the neck and throat, sometimes preceded by cupping on the nape of the neck, are chiefly to be relied upon. Venesection is rarely indicated and as rarely beneficial in this disease, unless in its most sthenic states, and in plethoric and robust persons, where it should be employed with a careful observation of its effects; but the treatment will depend much upon the character of the epidemic. The topical applications of alum, in the form of a paste or otherwise, or of

nitrate of silver, or of muriatic acid, as advised for *angina membranacea* (*see* art. THROAT) are now generally of no avail; and if the former means are inefficacious, tracheotomy must be resorted to, and should not be too long delayed, although a successful result from it is even less to be expected in this malady, than where it is performed in simple laryngitis; for there is a much greater disposition of the morbid action to propagate itself from the larynx downwards, in the complicated, than in the simple disease, and patients are more likely to be carried off by the consecutive bronchitis.

98. C. *In the Treatment of Acute Asthenic Laryngitis*, blood-letting is inefficacious or injurious, whether the disease appear in its *simple form* (§ 67.) or in any of the *complicated states* (§ 68.) noticed above. The means which are most likely to be of any service in any of these forms of the malady are calomel conjoined with camphor and opium, in large and frequent doses, and the terebinthinate embrocation already prescribed, kept constantly applied around the neck, fauces, and throat. In the intervals between the doses of calomel, camphor and opium, stimulants, tonics, and antiseptics, are often required to support the powers of life, and prevent the progressive deterioration of the blood. In the complicated asthenic laryngitis attending *cynanche maligna*, or any of the more *malignant forms of eruptive fevers*, or *erysipelas*, calomel is not often of service, as the laryngeal affection generally terminates life before any constitutional effect can follow its exhibition. If, therefore, it be given at all, it should be prescribed with camphor, or with camphor and opium, either in the form of powder, or linctus, so that it may act upon the fauces and pharynx, and thence upon the larynx. In these complications, tracheotomy should be performed at an early period of the laryngeal disease, if performed at all; but at any period of these the chances of success from it are very few; for the constitutional disease, and the frequently attendant association of congestions, or asthenic inflammations of the bronchi or lungs, reduce these chances to almost the lowest calculation. In the *primary asthenic laryngitis* (§ 67.) tracheotomy is more likely to succeed, when early performed, than in any of the complicated states, inasmuch as the infiltration of the submucous tissues is generally confined to the larynx. It should be kept in view, that this and the complicated states of the disease, being characterized originally by deficient vital power and a morbid condition of the blood, will rapidly become worse in both these respects; and that, if this operation be not resorted to at a very early period, the consequences of delay pointed out above will the more readily supervene, and the chances of success from it be remarkably reduced. If purgatives be resorted to at any period of the asthenic forms of laryngitis, — and they will be required in many cases — they should be combined with warm, tonic, and stomachic substances, and their operation be promoted by stimulating and antispasmodic enemata. Or enemata may, in many instances, be confided in chiefly, in order to evacuate the bowels. Spirits of turpentine with castor oil, — sometimes with common salt — or with camphor, assafœtida, &c., according to circumstances — generally are the most efficacious, and most appropriate to the states of the disease.

99. *D. Treatment of Chronic Laryngitis.* The *indications* of cure in the *primary form* of chronic laryngitis are: — 1st. To remove the inflammatory action and its consequences in the larynx: — 2d. To improve the general health, and 3d. To relieve urgent symptoms. — *a.* In order that the *first* of these intentions should be the more readily accomplished, as well as to prevent exacerbations of the disease, or accessions of severe cough or spasm of the glottis, the patient should avoid exposure to cold air, and other causes of irritation, particularly dust, smoke, fumes, gases, and every exertion of voice or speech. He should *rest* the organ as much as possible, and speak only when it is necessary, and then in a whisper merely. M.M. TROUSSEAU and BELLOC think, that speaking in a whisper is attended by no evil. The patient ought to have recourse to a *respirator* on all occasions of passing from a warm to a colder air; and he should pay attention to his diet and regimen, shunning every thing that is difficult of digestion, or that may offend the stomach or bowels, or excite the circulation.

100. General *blood-letting* is sometimes required in this form of the disease, and chiefly in plethoric and robust persons at the commencement of the disease, or when the chronic symptoms become aggravated into a more acute state. Local depletion by *cupping*, or by *leeches* applied to the sides of the neck, below the level of the larynx, are however more frequently of use, particularly when pain or tenderness of the larynx is felt, and they should then be employed with decision. If the disease has been consequent upon suppression of the menstrual or hæmorrhoidal discharge, leeches should be applied to the tops of the thighs, or to the anus.

101. External *derivation* or revulsion is more beneficial than vascular depletions when the disease has been of some standing, a recourse to which should then be contingent only upon certain circumstances. Various means of derivation have been advised, and each has been in vogue for a time. First the tartar-emetic ointment was employed, especially in this country; and then moxas were recommended, on the Continent particularly. Afterwards frictions with croton oil were advised, and various liniments and embrocations containing liquid ammonia. Besides these, blisters, the liquor lyttæ, mustard cataplasms, &c., were resorted to; and there are few of these which have not given temporary ease in a few cases, or have either been of no avail, or aggravated the malady, in others. The general error was that they have been applied either over, or too near, the larynx — too close to the seat of irritation to derive from or subdue it; and hence from their proximity rather administering to its duration than arresting it. These, if employed at all, should be applied at a distance from the larynx, as on the sides or nape of the neck, or top of the sternum as advised by me in the article CROUP (§ 46.). The only application that can be prescribed with advantage on the throat itself is the terebinthinate embrocation mentioned above; and the inhalation of the fumes from it, especially when their escape is moderated by a covering external to the flannel with which it is applied, is generally beneficial. A caustic, mezereon, or pea-issue, setons, or open blisters, or a pustular eruption produced by means of tartar-emetic ointment, and kept freely suppurating or

discharging in the nape or sides of the neck, or at the top of the sternum, are the most deserving notice, of the various modes of procuring a continued purulent discharge.

102. Most British physicians have recommended a mild *mercurial course*, in order to fulfil the first indication of cure; and in a few primary cases it has been successful, although a more severe course, and the contingencies connected with it, have in some instances even caused the disease, especially in those exposed to atmospheric vicissitudes and in the intemperate. M.M. TROUSSEAU and BELLOC adduce several cases of the success of a general mercurial treatment, even when the disease was not of the syphilitic species; and state that many cases truly desperate were cured by giving mercury to salivation. When the practice is determined upon, calomel may be given, triturated with sugar, in small or moderate doses, and in the form of linctus or electuary, so that it may come in contact with the pharynx and spiglottis; and its use should be persisted in until the mouth becomes slightly affected, or salivation is produced. A diminution of pain, or of constriction of the larynx; an improvement of the voice, and a looser and easier cough, indicate the good effects of this course. If it fail, or cease to be further beneficial, a recourse to appropriate medicines, prescribed in the form of *linctus* or *electuary*, or in similar semi-fluid vehicles, is occasionally of service. Those which are demulcent and cooling are commonly to be preferred; and I have generally employed various syrups and mucilages containing small doses of nitre, or of hydrochlorate of ammonia, and of camphor or of benzoin, with narcotics and sedatives, according to the peculiarities of the case; taking care not to offend the stomach, or to disorder any of the several digestive processes. If these means do not afford decided benefit, the liquor potassæ may be given, with small doses of a solution of the iodide of potassium, and with camphor and narcotics, either in the form of mixture or linctus. The *inhalation* of vapour or steam imbued with the fumes of camphor, turpentine, narcotics, balsams, &c., as already advised by me for the chronic forms of BRONCHITIS (§ 98.), is sometimes of service, and is, as just remarked, one of the sources of the benefit afforded by the terebinthinate embrocations recommended to be applied to the neck and throat in this disease. *Narcotics* are generally useful in allaying irritation and cough. The extracts of *belladonna* and *stramonium* may be added to the warm fluids used for the purposes of the inhalation of their steam, or they may be applied by friction to the anterior part of the neck. The salts of morphia may also be employed endermically on the back or nape of the neck.

103. The above treatment will generally remove the primary form of chronic laryngitis, if it have been adopted before extensive ulceration or destruction of the cartilages has taken place; and will sometimes be successful even in the specific or syphilitic form of the disease; but, when these lesions exist, slight hopes can be entertained from any mode of cure. MM. TROUSSEAU and BELLOC have recommended a *topical plan of treatment*. They observe that whenever inflammation becomes chronic, and affects only a circumscribed part of the economy, it commonly resists the most extensive and active general treatment; and that, on the contrary, it is almost always modified by topical treatment, whatever be the means. This, to a certain extent, explains the difficulty with which internal local diseases are cured, compared with those which are external. They consider it therefore obvious that, if by any means local applications could be made to the mucous membrane of the *larynx* without interrupting respiration, many cases might be cured which are considered incurable; and this they believe that they have done.

104. The *inspiration of dry or moist vapours* has been recommended in *phthisis laryngea* and in other affections of the respiratory apparatus; but those which have been employed — and often too empirically prescribed—have been either too acrid, stimulating and concentrated; and not being confined in their operation to the larynx, but acting upon the respiratory surfaces generally, have proved more injurious than beneficial. The action of these cannot be limited; and hence those only which I have advised above, and in the article BRONCHI (*chronic inflammation of*), and which are balsamic, aromatic, emollient, and narcotic, and cannot injure the lungs, should only be employed. MM. TROUSSEAU and BELLOC confine themselves to those which I had advised in the above article, long before the publication of their work; but they recommend still more active, and more strictly topical means consisting of both *liquid* and *dry applications*.

105. The *liquid applications* used by these writers, consist of solutions of nitrate of silver, corrosive sublimate, sulphate of copper, and pernitrate of mercury. They prefer, however, the solution of nitrate of silver, from the application of which no inconvenience has arisen. The solution of corrosive sublimate, of the strength of from one to eight grains to the ounce of distilled water, they found to be very serviceable in some cases of syphilitic ulceration. The solution of nitrate of silver, in the large proportion of from one to two parts, in four parts of distilled water, they apply to and behind the epiglottis, by a small roll of paper bent at its moistened end, or with a small piece of sponge fixed to a rod of whale-bone bent, at an inch from the sponge, at an angle of 80 degrees. The patient's mouth being opened wide, and the tongue pressed down, the sponge is passed to the top of the pharynx; and as soon as it reaches it, a movement of deglutition is produced, which carries the larynx upwards, at which movement the sponge is brought forward and squeezed under the epiglottis, and the solution freely enters the larynx. Convulsive cough and sometimes vomiting ensue; but the application causes no pain. MM. TROUSSEAU and BELLOC have another means of effecting their object. To a small syringe, like ANEL'S, a canula, at least five inches in length, and curved at its free extremity, is attached. The syringe is filled three-fourths with air, and one-fourth with a solution of the nitrate of silver. The canula is then introduced into the posterior fauces, opposite the larynx, and the piston being rapidly advanced, the liquid, mixed with the air in the syringe, falls in a fine shower on the superior part of the larynx and œsophagus. The patient is immediately seized with a violent fit of cough, which, however, need give no alarm. He is then immediately directed to gargle his throat with water

acidulated with muriatic acid or with salt water, which decomposes that portion of the solution which is not combined with the tissues.

106. *Applications in the form of powder* to the larynx, have likewise been recommended by MM. TROUSSEAU and BELLOC. Among these may be mentioned, in an inverse ratio to their power,—the sub-nitrate of bismuth, alum, acetate of lead, sulphate of zinc, sulphate of copper. Calomel and red precipitate also produce remarkable results in cases of ulceration, whether syphilitic or not, of the mucous membrane of the larynx. All these, excepting the sub-nitrate of bismuth, which may be applied pure, ought to be mixed with finely powdered sugar or sugar-candy in variable proportions, according to their activity: calomel with twelve times its weight of sugar; red precipitate, sulphate of zinc, and sulphate of copper, each with thirty-six times its weight; alum with twice its weight; and acetate of lead with seven times its weight of sugar; and nitrate of silver with twenty-two, thirty-six, or seventy-two times, its weight of sugar. The last is said to be most successful in erythematous laryngitis with erosions or ulcerations. The powders should be impalpably fine; the least roughness or perceptible fragment of a crystal occasions such cough as expels the powder. The powder is put into one end of a reed or glass tube, and the other is carried back as far as possible into the mouth. After a full expiration, the patient closes his lips around the tube and inspires suddenly and forcibly through it, some of the powder being thereby carried into the larynx and trachea. The cough which the powder excites, is advised to be restrained, as much as possible, so as to prevent a too speedy expulsion of it. This mode of applying these powders may be resorted to twice or even oftener daily, according to the nature of the case; but the mercurial powders should not, especially at first, be applied oftener than twice or thrice a week.

107. *Applications to the pharynx* are often beneficial in chronic laryngitis; for it is well known that this disease often originates in the mucous membrane of the *throat* (see article THROAT), especially in the tonsils, fauces, &c., and extends to the pharynx and thence to the epiglottis and larynx; and that it is often caused by enlargement or relaxation of the *uvula*, often in connection with other affections of the throat. Caries even of the teeth may affect the pharynx and larynx. In such cases, the treatment should be directed to the primary affection. An elongated uvula should be shortened, and suitable gargles prescribed. BENNATI extols gargles of alum and sulphate of zinc. MM. TROUSSEAU and BELLOC prefer the nitrate of silver, and, when angina pharyngea coexists with chronic laryngitis, they touch, two or three times a week, the tonsils and arch of the palate with a pencil of nitrate of silver or a solution of the same; or they apply a powder consisting of six or eight grains of the salt to about a drachm of powdered sugar. A strong solution of corrosive sublimate or of sulphate of zinc fulfils the same intention. Even when the mucous surface of the posterior fauces or pharynx is not affected with inflammatory irritation, the same means have been useful in chronic laryngitis.

108. *b*. The *second indication*, viz., to improve the general health, is generally required, and without attention be paid to it, the local measures above advised may be employed in vain. The means which should be adopted in order to attain this end ought to vary with the circumstances, and especially with the origin and complications of individual cases. When indications of irritation are observed in the throat or pharynx, or when the uvula is elongated, the digestive functions will be rarely found undisordered. These should be improved by mild tonics and purgatives, and by stomachic aperients and alteratives. The compound steel mixture with liquor potassæ, or the iodide of potassium with liquor potassæ and sarsaparilla, are amongst the most suitable medicines that can be resorted to with this intention, after the secretions and excretions have been evacuated. A residence in a mild, equable and congenial climate, strict attention to diet and regimen, and the use of mild chalybeate and deobstruent mineral waters, will very materially assist other means of cure. When the laryngeal affection is dependent upon an early stage of pulmonary *tubercles*, these will be especially requisite, particularly change to a warm, mild and equable climate.

109. In the *syphilitic form* of the disease, the constitutional cachexia must be removed as already hinted at, by a mild mercurial course, or by a course of iodine and sarsaparilla. In this species, gargles or the local application to the larynx of solutions of corrosive sublimate, and the exhibition of this substance internally, in the form either of pills or of solution until the system is affected, or conjoining it with tonics, sarsaparilla, &c., are sometimes very advantageous.

110. *c*. The *third indication*— or the relief of urgent or dangerous symptoms, is often called for in the course of the disease. Several of the means already mentioned, and recommended to be conjoined with other remedies, intended to answer the *first* intention, as the internal and external use of narcotics, anodynes, and demulcents, particularly stramonium, belladonna, &c., (§ 99. *et seq.*), will be required to fulfil this indication. Still, however skilful the treatment may be, these and other combinations of means may fail to prevent, or accidents may occur to produce, impending suffocation. In cases where the epiglottis is so ulcerated, or otherwise injured as not sufficiently to protect the rima glottidis, articles of food or foreign bodies may become entangled in, or may pass, the larynx into the trachea; and these, or threatened suffocation from other circumstances, as from the sudden infiltration or abscess of the submucous tissues, may require *tracheotomy*. When this operation has been resorted to, and a canula of sufficient diameter introduced, the affection of the larynx should be treated in a suitable manner, care being taken, in the way above advised (§ 96.), not to allow secretions to accumulate in the trachea so as to interrupt respiration. When the organ is capable of performing its functions, the canula may be withdrawn, and the wound will soon afterwards heal. If the disease of the larynx be of such a nature that the air cannot pass through the glottis, the canula must be continually worn. MM. TROUSSEAU and BELLOC adduce an instance of its having been worn for ten years.

111. *Females* suffering under chronic laryngitis, often experience violent exacerbations and

laryngeal spasms sometimes threatening suffocation. In these cases, especially when occurring in hysterical temperaments, the application of the terebinthinate embrocation around the neck, or a belladonna plaster or ointment, and recourse to an enema of spirits of turpentine with castor oil, and sometimes with camphor or assafœtida, will generally remove the attack.

112. IV. **Foreign Bodies in the Larynx or Trachea.**—The consideration of this subject in connection with diseases of the windpipe, has been neglected by all writers on these diseases, excepting Dr. **Stokes** and Mr. **Ryland**, although numerous instances of this accident, and minute accounts of the consequences produced by it, are on record. A somewhat particular notice of this subject has, however, been taken by **Pelletan**, **Louis**, and **Porter**. The situations in which the foreign body may remain, or into which it may pass, are—the rima glottidis itself; the ventricles of the larynx; the trachea; and the bronchial tubes, particularly the right. It may, from the efforts of coughing, be forced upwards into the trachea or larynx, thence to return again to its former position. The much greater frequency of the passage of the body into the right, than into the left bronchus has been imputed by **Dr. Stokes**, not to the greater diameter of the right than of the left tube, but to the manner in which the trachea divides to form these tubes, the septum at the bifurcation not being in the mesian line, but decidedly to the left of it, so that a body falling through the trachea, will most readily pass into the right division.

113. When the body has passed into the air-passages, various results are observed:—1st. It may be expelled forcibly through the glottis, after a period of time varying from a few moments to many years:—2d. It may produce death by suffocation, from its being impacted in the larynx.—3d. It may cause acute inflammation of the whole lung, owing to its lodgement in the principal bronchus, and the patient die before abscess is formed, or after an abscess has formed in the lung.—4th. It may occasion symptoms of consumption, from which the patient may recover with the discharge of it, or from which he may die. These very different results arise chiefly from the various grades of organic sensibility of the bronchial tubes in different persons, from the state of predisposition to disease in the lungs, and from the size, nature, and form of the foreign body. In some cases, remarkable pain is produced by it, in others, extensive disease takes place without any pain.

114. It is remarked by Dr. **Stokes** that facts are wanting to throw light on the occurrence of pain, but that the chief cause of distress most probably will be found to reside in the degree of mechanical obstruction produced by the foreign body, the distress being always found to be great in proportion to the feebleness of murmur in the affected lung. Thus, if a smooth body, such as a bean, enters the bronchus, and so obstructs the tube as totally to prevent the entrance of air, the distress is extreme, the patient being suddenly deprived of the use of half of his lungs; while, on the other hand, an irregular body, as a tooth, may exist long in the same situation, with comparatively little distress, because, though to a certain extent obstructed, the tube is not impermeable. This writer observes that, in the great majority of cases in which chronic consumption was produced, the foreign body was of an irregular form. The patients escaped rapid death, because the air-passage was not completely obstructed, and their disease proceeded from the long-continued irritation caused by this body.

115. *A. Diagnosis of Foreign Bodies in the Wind-pipe.*—When any substance remains impacted in the larynx, the symptoms are at once most violent, distressing and strangulating, the breathing being croupy, pain in the larynx more or less severe, the cough incessant, and attended by paroxysms of suffocation. The violence of the symptoms will depend much upon the degree of mechanical obstruction and the nature of the body causing it. The foreign body may, owing to these circumstances, produce almost instant death; or it may be expelled after a shorter or longer period; or it may fall into the trachea or bronchus, and, after an interval of comparative ease, be succeeded either by a return of the laryngeal symptoms, or by acute or chronic inflammation of the lung. Hence cases of this accident may be divided,—1st. Into those in which the foreign body has remained, from the first, entangled in the larynx;—2d. Into those in which having passed this part, into the trachea or into a bronchus, it is driven upwards from the trachea to be temporarily caught in the larynx, again to descend into the trachea or bronchial tubes, producing alternations of suffering and comparative ease;—and 3d. Those in which the foreign body, having passed into the trachea or bronchus, produces either acute disease with severe suffering, or more chronic inflammation with slight or consumptive symptoms.

116. *a.* In the *first* of these cases, the sufferings are those stated above (§ 115.); or they may be of a less severe character, as when the body is lodged in the ventricles of the larynx, where it may remain for a considerable period, but not without producing inflammation and its consequences. M. **Pelletan** instances the occurrence of a button-mould having fallen into the larynx, where it caused severe cough, and occasional attacks of suffocation. The trachea was opened, but, although the button was felt, it could not be extracted, until the cricoid cartilage was divided, and then it was taken from the left ventricle of the larynx. A soldier after drinking water from a pool was suddenly seized with symptoms of suffocation, and died whilst preparations were being made for tracheotomy. A leech was found in the right ventricle, and obstructing the glottis. The severity of the cough may occasion, in accidents of this nature, so great disturbance of the cerebral circulation as to produce apoplexy, or convulsions, according to the age of the patient; and death may follow from this circumstance, after the foreign body has been removed.

117. *b.* In the *second class* of cases, or in those in which the body passes into the trachea or bronchus, and is occasionally driven up, on expiration, against the larynx, or is caught in it, the greatest variety of symptoms may be produced, and intervals of ease may take place. When fever appears, it is consecutive upon the local irritation, and the paroxysms of suffering are induced either by the body being driven into the larynx, or by its being impacted into a principal bronchus so as to suddenly deprive the patient of one lung. From

the secretion of mucus consequent upon the irritation caused by it, a rattling takes place in the throat. As the disease proceeds respiration becomes stridulous, but the sound, according to Mr. Porter, is never so loud or so harsh as in croup. M. Louis has noticed the occurrence of emphysema above the clavicles. M. Lescure has adduced a case in which the lungs were emphysematous throughout. I have met with emphysema above the clavicles in one case of this kind, in a child about eight or nine years of age. Dr. Stokes considers it a rare symptom. The following *case* by this physician is interesting and illustrative of this subject.

118. A gentleman, aged 20, in previous health, while conversing in the act of eating a piece of cheese after dinner, suddenly fell from his chair in a state of insensibility. A probang was speedily passed into the œsophagus on the supposition that a foreign body had lodged there, and in a few minutes he partially recovered. The attack recurred soon after with great violence; the face was congested, and the breathing spasmodic and stertorous. He was then freely bled, but no improvement followed. A loud rattling in the throat was heard, the patient tossed himself on the bed, and threw his arms about so as to expand the chest as much as possible. All the muscles of inspiration were in violent action, and the surface of the body became pale and cold. Suspicion of asphyxia from tracheal obstruction being entertained, a stethoscopic examination was made. The chest sounded every where clear; but the vesicular murmur could scarcely be perceived in any portion of the lungs, the feebleness being equal and universal, notwithstanding that the patient made the most violent efforts at inspiration. A loud sonoro-mucous rattle, every moment increasing, was heard in the trachea, while the slight dilatation of the chest compared with the respiratory efforts clearly pointed out some obstruction in the windpipe. The failure of treatment calculated to relieve the brain, and the evident secretion into the trachea, as shown by the loud rattle at the top of the sternum, were strongly indicative of the symptoms not having been caused by spasm of the glottis, but by a morsel of food passed into the trachea. Tracheotomy was now performed, and a crucial incision made through the tube; and on the angular portions between the incisions being removed, a mass of pultaceous matter was forcibly ejected through the opening, with instantaneous and complete relief to the symptoms. Respiration became easy, the expansion of the lungs full and audible; the patient breathed through the glottis and quite recovered.

119. It may be mentioned here, that substances may pass into the trachea, during deglutition, through an ulcerated fistulous opening between the trachea and œsophagus, generally in the membranous portion of the former. Of this I have met with one case; and similar instances have been recorded by Zeviani, Van Dœveren, and others. In these cases, the ulceration, terminating in perforation, may commence in either canal, but generally in the trachea, and is almost always preceded by tubercular cavities in the lungs. In these cases, the symptoms are not materially different from these just noticed, or to those about to be mentioned in connection with the passage of foreign matters into the bronchi. This occurrence takes place chiefly in the last stage of tubercular phthisis, complicated with ulceration of the trachea and larynx.

120. *c.* In the *third class* of cases, or those in which the foreign body passes into a principal bronchus, and occasions either acute disease and severe suffering, or chronic consumptive symptoms (§ 115.), the particular lesions, as well as the phenomena which result, are very diversified. These are chiefly — 1st. Acute or chronic inflammation of the trachea, or of the trachea and larynx; — 2d. Acute inflammation of the bronchus in which the body is lodged; — 3d. Bronchitis with hæmoptysis; — 4th. Acute pleuro-pneumonia; — 5th. Abscess of the lungs; — 6th. Asthmatic symptoms; — 7th. Acute or chronic phthisis.

121. When the foreign body is thus situated, the consequences, and the symptoms attending them, are very diversified in different cases, according to its situation and form. The diagnosis depends on a careful examination of the history and symptoms and physical signs of the case. Generally, the sudden occurrence of irritation in a large bronchus, commonly the right, in a patient who had presented no previous sign of thoracic disease, is evidence that a foreign body had passed into it. The situation of the foreign body is often pointed out by local pain, but not constantly, even when this body is of an irregular form and irritating nature. The physical signs depend upon — 1st, its situation; — 2d, the degree of obstruction it presents to the entrance of air; — and, 3d, the amount of irritation it occasions. If it remain in the trachea, these signs are more obscure than when it is lodged in one bronchus; for, in the former case, the respiratory murmur is obscure in both lungs, but in the latter it is obscure in one lung only; he obscuration being in proportion to the degree in which it obstructs the passage through the bronchus. Hence the murmur is greatly lessened, or altogether extinguished in the lung whose bronchus is thus obstructed, whilst the sound on percussion remains the same, and the opposite lung presents the puerile respiration. If, however, the obstruction of the bronchus continue for a considerable time, without the foreign body being dislodged, or driven upwards into the trachea, congestion or inflammation of the obstructed lung may take place, the air in its cells be absorbed, and that side of the chest become dull on percussion, especially when compared with the other side. Hence the suddenness of the irritation, the existence of it before the appearance of constitutional disturbance, and the completeness of the bronchial obstruction in a whole lung, should be viewed as indicative of the occurrence in question, and lead to a more minute examination of the history and state of the case.

122. *B. Prognosis.*—Whatever may be the effects produced by the foreign body, — and these will depend not only upon the physical properties of this body, but also upon the peculiarities of the individual, — these effects do not always cease upon the removal of it. However, this circumstance ought not to prevent the institution of measures for removing it; as, when it is removed, the means, which the manifestations of the effects produced by it will suggest, will then more readily be followed by beneficial results. The *issue*, it is obvious, will depend upon nume-

rous circumstances — upon the various consequences noticed above, — upon the nature, size, and situation of the foreign body, — upon the local and constitutional disturbance produced, — and upon the removal or presence of this body; it has, however, been unfavourable in a large proportion of cases.

123. *C.* The *treatment* of this accident depends upon the bulk of the obstructing body. In most instances *tracheotomy* should be resorted to early; particularly when the body is large, is lodged in the trachea or larynx, and when it is moveable from a bronchus into the trachea. If it be firmly lodged in a bronchus, and have caused the lesions usually consequent upon it when impacted in this part, little hopes can be entertained from the operation. *Emetics* have been recommended, but they rarely succeed unless the body be of a small size. If it be large, it may be forced upwards during vomiting and caught in the larynx, and produce suffocation. Owing to this reason, Dr. Stokes argues against having recourse to emetics, and advises an early resort to tracheotomy. I believe, however, that there is less risk from the use of emetics, or of an emetic, than he infers; but I agree with him in advising a recourse to the operation early, and before inflammatory action is developed. — On this subject the reader will consult with advantage the works of Mr. Ryland, Mr. Porter, and Dr. Stokes, and the other writings referred to in the *Bibliography* and *References.*

124. V. Of Tumours external to, and Compressing the Windpipe. — Some notice has been taken of these, in connection with the production of spasm of the glottis (§ 28. *et seq.*); it is, therefore, unnecessary to add more on this subject than to enumerate the kinds of tumour that may affect either the trachea or larynx, particularly the former. The effects of tumours upon the windpipe may be *mechanical* only, or chiefly *vital*, or resulting from their influence upon the nerves of the tube, or upon the circulation through the veins of the neck; or both mechanical and vital. The tumours may be injurious in these ways either with or without compression of the tube so as to diminish its calibre; much of the effects produced by them depending upon their situations, their influence on the nerves and blood vessels, and the sensibility of the patient. When they are situated *above* the sternum or clavicles they are less likely to occasion injurious or urgent pressure on the trachea, than when they are developed *under* the sternum or upper portion of the chest. Those usually met with in the *former* situation are — abscess of the neck, — enlargements of the lymphatic glands, — Bronchocele, — tumour consisting of aqueous cysts sometimes developed in the vicinity of the thyroid gland but not affecting it, and described under the name of hydrocele of the neck, by Maunoir and O'Beirne, — aneurism of the carotid or thyroid arteries, — and solid or malignant tumours of the neck. These may form without materially compressing or displacing the trachea, owing to the yielding nature of the parts external to them and the trachea. But those tumours which are formed *under* the sternum and are more deeply seated, are generally productive of more distress, by affecting the trachea in these modes in a severer manner. They not unfrequently rise *above* the sternum, but their injurious effects chiefly depend upon the unyielding state of the parts external to them, and the consequent pressure therefrom resulting. In this *latter* class may be comprised, — aneurisms of the aorta and innominata — enlargement of the bronchial glands — hypertrophy, abscess or other lesions of the thymus gland — tuberculous or melanotic alterations of the bronchial glands — cancerous, or fungoid tumours in the posterior mediastinum.

125. In these different circumstances, it is very rare to find evidence of compression of the trachea, without signs of further disturbance, particularly great distension of the veins, dysphagia, and paroxysms of dyspnœa or of threatened suffocation; but dysphagia, in some cases, and stridulous breathing in others, may be the most prominent disorder. Of the various tumours now mentioned, producing pressure on the trachea, the aneurismal most frequently simulate laryngeal disease. This Dr. Stokes explains by their greater frequency, their ascent in the neck, and their close relation to the windpipe. The stridulous breathing, caused by their pressure, like that of chronic laryngitis, is of variable intensity; and their influence on the recurrent nerve produces either attacks of spasm or aphonia, thereby more closely resembling laryngeal disease. The *direction* of the pressure produced by these tumours is most frequently lateral.

126. The *diagnosis* between laryngeal disease and the pressure of an aneurismal tumour on the trachea has been well stated by Dr. Stokes. The symptoms of the latter are, — 1st. *Evidence of internal pressure,* as signs of compression of one bronchus; deep-seated dysphagia; turgescence of one or both jugular veins; œdema of the neck; signs of displacement of the lung: — all these are not however generally present, but one or more of them are usually observed. 2d. *Evidence of solidity in the upper portion of the chest;* as dullness on percussion of the upper sternal or either clavicular regions; bronchial or tracheal respiration, in the situation of the dullness; and loud resonance of the voice in the same situation. 3d. *Proper signs of an aneurism:* pulsation or bellows-murmur in the sternal or clavicular regions. And 4th. *Difference of the radial pulse.* — Attention to these points will prevent an aneurism from being confounded with tracheal or laryngeal diseases.

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LEPROSY. — SYNON. : *Lepra Tuberculosa ; Lepra Hebræorum ; Lepra Ægyptiaca ; L. Leontina ; L. Arabium ;* the *Tsarath* of Moses ; ἐλεφαντίασις, Aretæus ; *Elephantiasis Græcorum ; Elephantiasis*, Good, Cullen, Sagar ; *Leontiasis ; Lepra Nodosa ;* the *Djuzam*, or *Iuzam* of Arabian writers ; *Lepra Medii Ævi*, or *Leprosy* of Authors of the Middle Ages ; *Lepre Tuberculeuse ; Mal Rouge de Cayenne*, Fr. ; *Der Elefantenaussatz, der Aussatz die Feldsucht*, Germ. ; *Tubercular Leprosy ; Elephantiasis of the Greeks.*

CLASSIF. — 3d *Class.*, 3d *Order* (Cullen). — 3d *Class* ; 4th *Order* (*Good*). — IV. CLASS IV. ; ORDER (*Author*).

1. DEFIN.—*Dusky red or livid tubercles of various sizes on the face, ears, and extremities ; thickened or rugous state of the skin, a diminution of its sensibility, and falling off of the hair, excepting that of the scalp ; hoarse, nasal, or lost voice ; ozæna ; ulcerations of the surface and extreme fœtor.*

2. Considerable confusion has arisen from not distinguishing this disease from *elephantia*, or elephant-leg, on the one hand, and from the squamous lepra, or *lepra Græcorum*, on the other, — diseases perfectly distinct from each other. Indeed, most of the tuberculous and scaly diseases, especially the *lepra* and *psoriasis* of WILLAN, were deemed *leprous* and received into the lazarettoes. The circumstance of the description in the books of MOSES of several forms of cutaneous disease as being leprous, and the applicability of parts of that description to the above squamous affections, have contributed to this confusion. In order to simplify the subject, it will be preferable to consider the *true leprosy of the middle ages* entirely apart from the chronic scaly eruptions just mentioned ; and to view the lepra of WILLAN, as M. SCHEDEL has done, as a species only of psoriasis, more especially as the appearance, nature, and treatment of both these squamous diseases are very nearly the same. I shall here briefly describe tubercular lepra, as it appears to have prevailed during the middle ages, and down to modern times in Europe, and as it is occasionally met with at the present day in some warm and eastern countries ; and afterwards notice certain modifications of it observed in various countries. I have viewed the *scaly lepra* as a species of *psoriasis.*

3. I. DESCRIPTION OF TUBERCULAR LEPRA. — Several writers state that physical and moral languor and depression often precede the appearance of the disease in the skin. Occasionally the *spots* and *tubercles* characterizing the disease appear in the skin with febrile symptoms ; but the attack is more commonly very gradual and slow. Patches of the integuments are generally changed in colour, and assume a darker hue before the developement of the tubercles. The *spots* become even deeper in colour than the skin in the dark races ; and yellowish, or reddish, or livid, shining, and slightly elevated in whites. These spots are irregularly disseminated, and look as if they were full of oil, or covered with varnish (ADAMS). They are occasionally quite *insensible*, but more frequently feeling is not quite absent in them, although they may be compressed without pain. At first, sometimes, they are more sensible than the surrounding skin ; but this state, and the redness attending it, subside by degrees ; the flush being followed by a tawny or bronze colour. The spots, after being stationary for a period of various duration, are always succeeded by tubercles, some of which are cutaneous, others are seated in the cellular tissue underneath. The cutaneous tubercles are small, soft, round, reddish, or livid, varying in size between that of a pea and an olive. They appear on every part of the face, particularly the nose and ears, and on the legs, but in rare instances they have occurred on the legs only. Commonly in a few years they spread over the whole body, although they are more numerous in some parts than in others ; and the malady becomes more and more marked. Of all places, the face is most affected and most deformed by it. The visage is puffed ; the skin of the forehead is beset with tubercles, and marked by numbers of deep transverse furrows. The superciliary ridges are swollen, furrowed with oblique lines, and covered by nipple-like projections. The hair of the eye-brows and the cilia are lost. The lips become thick and shining ; the chin and concha of the ear enlarge, and are thickly covered with livid tumours. The lobe and alæ of the nose are generally even more seriously altered than the rest of the face : the nostrils are irregularly dilated, and the cheeks are swollen. The whole of the features, enlarged and distorted by the puffing of the subcutaneous cellular tissue and by the tubercles, present a frightful deformity.

4. Arrived at this stage, tuberculous lepra sometimes remains stationary for a very consider-

able period. The skin then seems principally implicated, the chief functions being but little disturbed. The time which elapses between the appearance of the first tubercles, and the developement of those which succeed them, varies exceedingly. Frequently they are rapidly evolved; but they never acquire a very large size. Subsequently, commonly after some years, the greater number of these tubercles inflame, and either suppurate or are resolved. Ulceration, according to M. RAYER, is preceded by an acute inflammatory state, during which the tubercles and the surrounding integuments become hot and red. The tubercles, which are ulcerated, soften and discharge a sanious pus, that dries up speedily, and forms adhering brown or blackish scabs, which rarely rise above the level of the skin. Sound cicatrices are formed under these scabs, in rare instances.

5. When the disease appears before the age of puberty, the growth of the beard, and of the hair upon the genitals and axillæ, is often prevented or checked. In some, however, the beard only is wanting. In adults, the beard, and the axillary and pubic hair occasionally, but very rarely the hair of the head, are lost. Frequently the sensibility of the skin is somewhat impaired, sometimes it is at first increased, occasionally not changed. As the disease advances, it is often very much impaired in the extremities, especially the lower. The tubercles on the upper extremities follow the same course as that above described. They are less numerous than on the face; and appear chiefly on the outer and posterior surfaces of the fore-arm. The hand is swollen, but is rarely the seat of tubercles; it is commonly livid, with less of the bronze cast than other parts of the body. The lower extremities and feet are similarly, but generally more severely affected. The hollow space of the sole is filled up by the swelling of the cellular substance, giving the feet a flat appearance. The tubercles of the buttocks are large, those of the soles are flattened. Ulceration of the tubercles of the legs is always slow of healing. The phalanges of the toes occasionally sphacelate, especially when the disease is complicated with serious internal lesion, and is tending to a fatal termination. The trunk of the body is seldom the seat of tubercles.

6. The mouth, the fauces, uvula, tonsils, pharynx, and nasal fossæ, are often studded with tubercles of a smaller size than those of the skin. A longitudinal band of tubercles frequently extends from the superior incisor teeth backwards, along the roof of the mouth to the uvula. The lingual veins are sometimes varicose. The pituitary membrane is generally inflamed, and secretes a sero-purulent fluid, the inflammation occasioning pain of the frontal sinuses, and ultimately caries of the cartilages and turbinated bones of the nose. The voice becomes hoarse, nasal, and is finally lost. The external parts only of the ears are affected; but these are enlarged, deformed, livid, and studded with tubercles. The sense of smell is early impaired, and soon altogether lost; especially when the pituitary membrane ulcerates and discharges a profuse fœtid secretion. The eyes are not materially affected, beyond the loss of the cilia. The sense of taste is not impaired. The pharynx becomes covered with tubercles, but the æsophagus is seldom thus affected. The stomach and bowels generally perform their functions regularly, unless they be disturbed by active medicines.

7. The organs of locomotion are generally much enfeebled. If the disease has commenced before puberty, the patient continues weakly, and gradually becomes deformed; but if manhood has been attained before its invasion, and the person is fully developed, the affection of the muscular system approaches, and proceeds slowly and gradually with the progress of the disease. The influence of the malady upon the generative organs has not been precisely determined. According to some writers the evolution of these organs is always arrested by it, when it occurs before puberty; and it causes them to fall into a state of atrophy when it appears after this period. PALLAS states that the Tartars affected with the malady show a distaste of sexual intercourse. All the patients M. RAYER saw had the genital organs well developed; and none of them was tormented by the *libido inexplebilis*, mentioned by some authors as a frequent concomitant of the disease.

8. *Terminations.* — Tuberculous lepra is seldom seen in Europe; hence its morbid anatomy has been imperfectly studied. But the most exact accounts which have been furnished concur in showing that persons who are the subjects of it are almost always carried off by acute or chronic inflammations of the respiratory organs and passages, and of the digestive viscera; and less frequently by low fever.

9. *On Dissection*, PEYER's glands have been found enlarged; the intestinal tubercles ulcerated, or about to become so; and the mesenteric glands enlarged and tubercular, in persons who have died of the disease. Small cicatrices have also been observed in the intestines. The liver and spleen have not been materially altered. A thickened state of the mucous folds of the larynx, tubercles on the vocal chords, occasionally ulcers which had destroyed the ligaments, &c., and small ulcers of the mucous coat of the trachea, have been found after death, and account for the affection of the voice during life. The lungs generally contain crude or softened tubercles scattered through them. Three patients examined by M. RAYER, had the lungs thus affected. Others who have died at an advanced period of the disease have shown distinct marks of pneumonia. The organs of circulation, and the nervous centres, present nothing remarkable. In a coloured man, which I saw examined after death from this disease, the heart was smaller and softer than natural.

10. II. MALADIES ALLIED TO TUBERCULAR LEPROSY. — The *leprosy* of *Iceland*, as described by Dr. HOLLAND and others; that of the *Faroe Isles*, noticed by DEBES; the cases which occurred in the *Shetland Isles*, and mentioned by Drs. EDMONDSTON and SIMPSON; those observed by Dr. HEBERDEN and Dr. ADAMS in *Madeira*, as well as those still met with in *Africa* and in the *East* and *West Indies*, are identical with the disease now described — the leprosy of the middle ages. There can be no doubt of the disease being somewhat modified by endemic influences; and by modes of living and other circumstances proper to the individual, even in the same locality; but several maladies very distinct from it have been confounded with it,

although its tubercular character offered a sufficient distinction between them.

11. i. LEPRA TAURICA.—*Leprosy of the Crimea.* —*L. of the Cossacks.* PALLAS, GAUTIER, and MARTIUS, have described this disease, which they say was introduced by the Russian troops engaged in the war against Persia, into the Crimea. The description given of it by VON MARTIUS shows that it is identical in its accession, course, progress, phenomena, and terminations with true tuberculous leprosy. It is therefore unnecessary to occupy my space with an account of it. The same remark applies to the *leprosy of Holstein*, as described by Dr. STRUVE.

12. ii. LEPRA ANÆSTHESIACA.—This is supposed to be the *Baras* of AVICENNA, and has been observed by WINTERBOTTOM, ROBINSON, and myself. It is characterized chiefly by remarkable absence of sensibility not only from the extremities, but also from the general surface; and by the comparative smoothness of the skin, and frequent absence of a tubercular state of the integuments. It is probable, however, that these are merely modified or extreme cases, in which the anæsthesia, and ulceration of the extremities are the prominent phenomena, and the tubercular changes less manifestly produced, or at a more advanced period of the malady. It is likewise very probable, that the several diseases, which were considered as *leprous* in remote ages, among the Jews, and in more recent times in Eastern and Inter-tropical countries, were more or less closely allied, and it is not unlikely that in these ages, and even in modern times, several squamous and cachectic maladies assumed a more inveterate and irremediable form, in consequence of the nature of the food used by their inhabitants, and that these maladies are not only remarkably modified from the states now presented by them in highly civilized countries, but, as respects some of them, are also thereby rendered specifically different.

13. When we consider, that the use of salt was by no means general in some countries, during the early and middle ages, that this substance was procured with difficulty in many countries, and is still scarce and valuable in several, even at the present day; that all kinds of animal food, even the richest and coarsest, flesh-meats and fish, were often eaten in a rancid or semi-putrid state; that they were rarely cured otherwise than by smoking, or by drying them in the air; that in many countries most of the food used during the greater part of the year was preserved in this manner, and that vegetable food was in most of them but little employed; that periods of scarcity, or of want of vegetable substances or of grain, often heightened the injurious influence of unwholesome animal food; that the clothing worn next the skin was generally woollen, and retentive of the secretions from the surface, thereby irritating and contaminating it; and that habits of personal cleanliness were very imperfectly adopted, it will not appear surprising that chronic cachectic maladies were of frequent occurrence in the ages and countries thus circumstanced; that they assumed various forms, with the nature and combination of the diversified causes producing them; and that they have changed their forms with changes in the intensity and concurrence of these causes.

14. The *Lepra Anæsthesiaca* has been described by Dr. WINTERBOTTOM and by Mr. ROBINSON, and their accounts of it agree in many respects with what I have seen of it in Africa. It commences in spots or patches, which are of a somewhat lighter shade of colour than that of the adjoining surface in blacks, and of a tawny colour in whites. These patches appear first in the feet, hands, legs and arms, and seldom on the face and trunk until a more advanced period. They sometimes seem slightly prominent from thickening of the several tissues of the skin; and they are shining rough and apparently wrinkled, from minute indented lines; but the wrinkles do not run into the surrounding skin. The hair—if any have previously existed in the seat of these patches,—fall out, or cease to grow in them. The patches are insensible, and extend slowly over the legs and arms to the trunk, until the extremities, and sometimes also the greater part of the surface of the body is more or less affected, and deprived of feeling. The affected surface is unperspirable, but neither itchy, nor painful, nor swollen. As the disease advances, the pulse becomes slow and soft, and the bowels constipated. The toes and fingers are benumbed as if with cold, shining, slightly swollen, and stiff. The soles of the feet and palms of the hands present hard and dry chaps; and a furfuraceous matter is deposited below the nails, raising them and causing ulceration around them. The legs and fore-arms next swell, and the skin becomes rough and chapped. Ulcers form on the metacarpal and metatarsal articulations, in the lines of flexion; and afterwards in the corresponding parts of the articulations of the larger joints. These ulcers enlarge and sphacelate, and the fingers and toes drop off. The lobes of the ears, the alæ nasi and the lips are in some cases thickened and enlarged, and ultimately ulcerated, discharging a thick viscid matter. As the malady is proceeding to this stage, tubercles form in many instances in the skin of the limbs, face, and sometimes of the trunk. As the small joints are penetrated by ulceration and fall off, so they heal up, and others are attacked in succession, until the limbs are deprived, one by one, of their extremities. The voice becomes hoarse and guttural, and ulceration sometimes attacks the throat, but in a less degree than in the more prominently tubercular form of the disease. Occasionally the extremities, cicatrised stumps, and portions of the skin, are thickened, tuberculated or ulcerated. Food is taken with an appetite and slowly digested. The intellectual as well as the vital functions are impaired and benumbed. The patient is apathetic and merely vegetates; yet he often lives for many years in the slighter or earlier stage of the malady, or even in the state of mutilation characterizing the far advanced stage. At last he is carried off by diarrhœa or dysentery.

15. The above account, which is chiefly from my own notes, is somewhat different from that given by Dr. WINTERBOTTOM, which, however, is confused and imperfect, and evidently owing to his having described as varieties, different stages merely of the same malady. Mr. ROBINSON has also, judging from my own observation, and from the accounts given by Dr. AINSLIE, described as a distinct species what appears to be merely a modification of the disease, in which the anæsthesia, and the falling off of the fingers and toes, were the most prominent phenomena. He however

admits, that *tubercular changes* sometimes show themselves in the course of the *Anæsthetic* variety. This is agreeable to my own observation. As the cases which I saw in several parts of Africa, were modified, according to the stages of the malady, some approaching more closely to the anæsthesiac, others to the tubercular, I believe that the two forms of the disease insensibly pass into each other. Mr. Robinson mentions the occasional occurrence of the chief characteristics of both varieties in the same patient; and Dr. Ainslie remarks that he never met with a case of genuine leprosy which was not distinguished both by want of feeling in the extremities, and by tubercles. Both modifications are equally prolonged, and both make more rapid progress in the poor, ill-fed, old, and debilitated, than in the rich, well-fed, and young.

> " Denique sæpe hominem paullatim cernimus ire,
> Et membratim vitalem deperdere sensum:
> In pedibus primum digitos livescere et ungueis;
> Inde pedes et crura mori; post inde per artus
> Ire alios tractim gelidi vestigia leti."
> Lucretius, L. iii. 525.

16. iii. Jewish Leprosy. — The term *Berat* seems to have been applied by Moses generically, and to have included — 1st, *Boak*, a form of the disease not rendering the person affected by it unclean; 2d, *Berat lebena*, bright white berat; and 3d, *Berat cecha*, dusky berat, spreading in the skin. The *second* and *third* species he describes as being called *Tsorat*, venom or malignity, and as contagious. The form of *Berat*, called *Boak* by the Hebrews, seems to agree with the *lepra vulgaris* of Willan. Dr. Good considers the *third*, or *Berat cecha*, to be the same with the *lepra nigricans* of Willan and Bateman. It may be so, but there is no further proof of this than of its being the tuberculous or true leprosy of the middle ages. The *second* variety, or the *Berat lebena*, is probably the *Leuce*, or λευκη, of the Greeks, and the third species of *Vitiligo* of Celsus.

17. The Jewish leprosy has been assimilated to other diseases. Bartholinus, Leclerc, and others associate it with tubercular elephantiasis. Hillary and Adams think that it was the Frambæsia of Africa. Lorry and several others regard it as a distinct malady. It is impossible to form, from the scanty accounts furnished us, a just idea of the disease. It is, however, not unlikely that the term leprosy was applied by the Jewish priests to various cutaneous affections, particularly those which were of a chronic, self-contaminating, or contagious nature; and it is probable that *Frambæsia* was one of these, as well as other inveterate cutaneous maladies arising from the modes of living, the habits and circumstances of the Jews at that time, and of the Egyptians; and that these maladies have changed their characters, owing to changes in the nature and combinations of their exciting causes.

18. iv. The Radesyge, a disease very prevalent in Norway, has been considered by many as a variety of tuberculous leprosy, from its very close resemblance, in many of its symptoms, to that malady. But in the article on that disease I have shown it to be generically distinct — that its characters, course, and terminations are quite different from the leprosy of the middle ages. This is still more especially the case with Pellagra (which see).

19. The *spedalskhed*, a disease prevalent in the district of Bergen, in Norway, has been confounded with *radesyge*; but, from recent researches, it is fully proved that it is identical with the leprosy of the middle ages, or elephantiasis of the Greeks — with the leprosy still existing in Norway and in eastern countries, and hence quite distinct from the *radesyge*.

20. III. Diagnosis. *A.* — The term *leprosy* has been applied indiscriminately to the *elephantiasis* of the Greeks, the *lepra* of the Arabians; to the *leuce* of the Greeks, the *beras* of the Arabians, or the *leprosy* of the Jews; and to the slighter scaly affections to which the names *lepra* and *psoriasis* were given by the Greeks and moderns. It seems extremely probable that other diseases, perfectly distinct in their natures from one another, and from those alluded to, were often included under the generic appellation of leprosy, provided that they possessed the general characteristics of inveteracy, or a disposition to self contamination, or to propagate themselves by contact with the morbid matter secreted by them. This seems to have been the case, especially among the Jews and eastern races. From the very precise accounts furnished by the writers of the middle ages, particularly those subsequent to the Crusades, the term *leprosy* was applied with tolerable precision to the elephantiasis of the Greeks, — to the tubercular disease. The monk Theodoric, Lanfranc, Bernhard Gordon, De Chauliac, Gilbert, John of Gaddesden, and several others have described this malady, as it occurred during the 14th century, with more precision and minuteness than any modern writer. As Dr. J. Y. Simpson remarks, in his very learned paper on leprosy and leper-hospitals, the details which they, and some other writers of that period, have given of the chief characters of the disease, are altogether similar; and the symptoms are exactly those which distinguish the Greek elephantiasis. They also enter most minutely into all the local and constitutional symptoms, with the view of faithfully distinguishing the disease; and they point out the mode in which a suspected person ought to be examined, before the existence of a malady which is to consign him to a leper-hospital should be decided upon.

21. It seems, however, that the precision thus laudably cultivated by the earlier of the middle age medical writers was subsequently departed from; for, during the fifteenth and sixteenth centuries, all cutaneous eruptions of an obstinate character, or attended by ulcerations, were deemed leprous and received into lazar-houses, which were extremely numerous throughout all Europe, particularly in countries bordering on the Mediterranean.

22. As recently as the times of Horstius and Forestus (the close of the sixteenth century) persons affected by elephantiasis, scabies, psoriasis, or psora, or the lepra of the Greeks, were treated as *leprous* and received into those asyla. Even Riedlin, as late as the close of the seventeenth century, remarks that the patients admitted into the Leper Hospital at Vienna presented every species of cachectic disease, characterized by affections of the skin, or ulceration and gangrene. At the present day the term *leprous* is restricted by the medical men of this country, particularly to those varieties of squamous affections, which the Greeks denominated *lepra* (λεπρα); whilst, in Continental countries, and in the East

more especially, it has been applied to the *elephantiasis Græcorum*, the *tubercular leprosy*, or *lepra Arabum*. I have already stated my reason for removing the *scaly lepra*, or the *lepra* of the Greeks, and of Willan and Bateman, to the genus *psoriasis*, to which it properly belongs, and of restricting the term *leprosy* to the *tubercular disease*, the elephantiasis of the Greeks, the lepra of the Arabians, to which this term was strictly applied by the writers of the middle ages, and by most of the later writers, although several other cutaneous affections, besides the tubercular leprosy, were received into the *leper*, or *lazar-houses*, in more modern times. It is probable, however, that the strictness of diagnosis observed during the thirteenth and fourteenth centuries depended on the circumstance of the seclusion of the leprous being enforced, whilst subsequently persons suffering under chronic maladies supposed to be allied to leprosy, were allowed to enter, for the advantages of medical treatment, those leper institutions possessing the characters of an hospital, and where medical treatment was resorted to.

23. Guy de Chauliac, the celebrated surgeon of the fourteenth century, assigns the following *six* symptoms as the most unequivocal of this malady: —"rotundity of the ears and eyes; thickening and tuberosity of the eyebrows, with falling off of their hair; dilatation and disfiguration of the nostrils externally, with stricture of them within and fœtidity of the lips; voice raucous and nasal; fœtidity of the breath and of the whole person, fixed and horrible satyr-like aspect." John of Gaddesden remarks that "no one is to be adjudged a leper and separated from mankind, until the figure and form of the face is actually changed. Hence, ulceration of the feet, or foul scabbing must not be considered as arguing the presence of leprosy, nor nodosities, unless they appear on the face and with the aforesaid conditions." Glanville, another English author, who wrote in the fourteenth century, "De Proprietatibus Rerum," states, according to the translation of the vicar of Barkeley, that leprous persons "have redde whelkes and pymples in the face, out of whom oftenne runne blood and matter; in such the noses swellen and ben grete; the virtue of smelling faileth, and the brethe stynkyth ryht fowle." *** "The infectyd are unclene, spotyd, glemy, and guyttery: the nostryls ben stopyl, the wasen of the voys is rough, and the voys is horse, and the here falls." No recent, or even modern, writer has distinguished this malady with greater precision than the above early authors. The *Definition* of Sauvages is perfectly diagnostic of the malady: — "*Facies deformis tuberibus callosis, ozœna, raucedo; cutis Elephantina, crassa, unctuosa; in extremis artubus anæsthesia.*"

24. *B.* The difference between it and *Elephantia* —the *Elephantiasis of the Arabians*,—is very wide. This latter is not a tubercular malady, and commences in the lymphatic veins and sub-cutaneous cellular tissue, and not in the skin itself; this latter structure being only consecutively altered, (see art. Elephantia, *or Elephantiasis of the Arabians.*)

25. *C.* The differences between *tubercular leprosy* and *tubercular venereal affections* are, chiefly, the appearance of leprosy in Europe very long before the venereal disease, and the characters which are peculiar to each. The blotches and tubercles of *leprosy* are of a shining brownish tint, of an oily look, soft, tawny, irregular, distinct, separated by fissures, and attended by a general puffiness, loss of hair, and occasionally by much insensibility of the skin. The tubercles of *syphilis* are red or livid, hard, developed in the substance of the corion, clustered together, not insensible, generally consequent upon venereal ulcers, and not attended by loss of the hair, of the parts which they affect.

26. IV. Causes.—M. Rayer remarks that, first observed in Egypt, then in Italy during the time of Pompey, leprosy subsequently extended, and has since been seen in the four quarters of the globe. It spread over the whole of Europe like an epidemic during the middle ages, especially about the period of the Crusades. Since the commencement of the 17th century, this malady has gradually disappeared from the countries of Europe; and is now confined to inter-tropical regions. It is more common among the poor than the rich; in the indigent, and in strangers after residence in a warm country. It has been described by Pococke as it occurred in Asia Minor; by Prosper Alpinus, Desgenettes, and Larrey, in Egypt; by Bruce, in Abyssinia; Marsden, in Sumatra; Marshall, in Ceylon; by Robinson and Ainslie, in India; by Bergeron, in Cayenne; and by various writers in St. Domingo, Martinique, New Orleans, the Isle of France, Coast of Africa, &c. From these localities enjoying a warm, humid, and variable climate, M. Rayer concludes that such a climate is favourable to the developement of the malady. But it was as prevalent in northern as in warm countries during the middle ages; and, although it has almost entirely disappeared from the former of these, it is probable that cases may still lurk in some European localities, the descendants of those who were subjects of the malady. The disease was prevalent in the Faroe Islands as late as 1676, when it was accurately described by Debes, and its causes assigned with greater truth than by any modern writer. It continued also to occur in the Hebrides and in the Shetland Isles, long after it had entirely disappeared from the southern parts of Great Britain. Brand mentions his observing it in the Shetland Isles in 1700; and as late as 1742, the Island of Papastour continued to be the place assigned for the seclusion of those affected by it. In 1736 and 37, this island contained five persons afflicted with this malady; and an account of it was drawn up by the Rev. A. Fisken at that time, and is in the possession of Mr. Barclay. It has been recently published by Dr. Simpson; and it contains an extremely accurate description of this disease. In 1772 and 76, there was one case in this island; and in the account furnished by Mr. Rannie, Session-clerk, mention is made of a leprous woman in 1778, who died in the fields before a house could be built for her; that about the same time there were leprous persons in the district of Watness; and that the son and daughter of a man were infected and sent to the Hospital at Edinburgh. In 1798, a young man, a native of these Isles, was a considerable time in that Hospital, affected with this malady; and in 1809, Dr. A. Edmondston met with a case of it.

27. The *exciting causes* of this malady, once the most generally diffused, the most surely and slowly fatal, and the most permanent, of all those

which have prevailed, at any time in the human species, are veiled in obscurity. It appears to have been prevalent for several centuries; and, although it may not have been, for a considerable portion of that time, so common as syphilis and scurvy, which followed it in succession, yet it was more certainly fatal and dangerous than they to the posterity of those who became the subjects of it. That it was believed to have been contagious, is proved by the strenuous efforts made to seclude the diseased, and prevent their communication with the healthy. In the account, above alluded to, of the Shetland lepers, it is mentioned that "the disease is found by experiment to be very infectious, and seems also to run in the blood, most people that have taken it without infection from another, having been related to three families in the isle. It affects any age or sex, and young persons bear it longer than those of a more advanced age, some having lived ten years under it, others only two, some four, some six, &c.; but none ever recover after the symptoms fully appear."

28. The Rev. L. J. Debes, whose curious and rare work is now before me, assigns what appears, as I have already hinted (§ 13.) to have been the chief causes of this malady. "I find the cause of the leprosie to be the air and the dyet; for here is a pretty cold and moist air, which usually causeth the scurvy to those that lead a solitary life, and this hath a great affinity with leprosy. Besides the meat of all, specially of the poorer sort, is half rotten flesh or fish, all their nourishment in summer being likewise fresh fish and sweet milk, without any salt; wherefore he that is not of a strong and good complexion, may easily have his blood corrupted, the sickness gnawing itself through the body before it breaketh out, and when any one is so infected, he may easily give it to another that is of the same complexion with the sick." — "It has also been taken notice of, that two living together in marriage, though the one be found infected, they live together as before as long as one doth but murmur of it, till the magistrate doth separate them, and yet the sound remaineth uninfected, whereas another is often taken with the disease by a very little conversation." —(pp. 312, 313.)

29. Dr. Ainslie expresses a doubt of the contagious character of the disease; but he admits, with all others who have had opportunities of investigating the nature of the malady, that it is hereditary. On this subject Dr. A. Edmondston remarks that this disease is hereditary, "and has been transmitted to successive generations, without extending itself to individuals living under the same roof, or even to all the offspring of the same parents; nor does it seem to propagate itself by infection, unless in those cases where a matter is generated and discharged from the sores. This is the certain medium of communication, and an inattention to this circumstance has given rise to contradictory views of its nature."—(*Edin. Med. and Surg. Journ.* vol. vi. p. 164.) I believe that there is much truth in the latter part of this quotation;—I quite agree with this opinion of my late friend. He adds, at another part, "that it was propagated by contagion cannot admit of a doubt. We have seen that it prevailed very generally in the Shetland Isles about sixty-five years ago, and all the inhabitants were deeply impressed with a conviction of its contagious nature; and the history of the disease but too well confirms the accuracy of the opinion."

30. The investigations of Mr. Stewart at Tranquebar, where tubercular leprosy is very prevalent, has induced him to give the following as the results:—1st. That women are less liable to this malady than men:—2nd. That it is hereditary:—3rd. Its being contagious is extremely problematical:—4th. That every leper, suffering from an advanced stage of the malady, doubts whether he is capable of propagating his species:—5th. That a fish diet is found to render every symptom worse:—6th. That poor living, want of cleanliness, mendicant misery, and exposure to cold and damp, are but too constant attendants of this dreadful affliction.

31. From my limited observation of this malady, chiefly in Africa, as well as from other sources of information, I believe that it owed its origin principally to the use of smoked, wind-dried, and semi-putrid or rancid flesh meats and fish, and of rancid oils; to the want or disuse of salt; to the use of unripe, or spoiled, or mouldy grain; to the want of vegetable productions as articles of diet; to inattention to personal cleanliness; to the nature of the clothing; and to the contact of the matter discharged from the leprous sores, when the disease was far advanced, and when the matter came in contact with the skins of those who were already predisposed to it by the modes of living alluded to, and by want of cleanliness.

32. V. Treatment.—Much good may be done by avoiding the presumed causes of the malady. The *cure*, when the disease is fully advanced, is hopeless; but in the early stages, it may be either entirely removed, particularly if it have recently commenced, or if the malady is confined to the extremities, or it may be arrested for many years in its progress. The Arabian physicians trusted chiefly to mercury. Dr. Hillary avoided mercury and prescribed sarsaparilla. Dr. Towne thought that antimonials afforded the greatest relief, and that mercury aggravated the disease. I believe, however, that the bi-chloride of mercury, given with the compound tincture of bark or with the compound decoction of sarsaparilla, so as to produce both a tonic and an alterative effect, is really of great service in the early stage of the malady. Dr. Ainslie always endeavoured, first to improve the health by nourishing diet, cleanliness, and exercise; and afterwards to act upon the disease by a cautious use of the bi-chloride of mercury and warm baths, supporting the frame at the same time by generous living. He also mentions the mineral acids and the combination of antimonials and aromatics with approbation. The Hindoo physicians consider the white oxide of arsenic as a powerful remedy for this disease; but Dr. Ainslie was disappointed in his trials of it. Of all the alterative and deobstruent remedies, he adds, employed by the native practitioners of India, none is of equal repute with the concrete milky juice of the *asclepias gigantea*, given with sulphur and continued for some weeks. Dr. Heberden states that he cured a patient in five months by means of a mixture of an ounce and a half of powdered cinchona, and half an ounce of powdered sassafras root, made into an electuary with syrup, the patient taking the size of a nutmeg twice daily. M. Rayer sup-

poses, however, that a recourse to these and other tonics, as arsenic, &c., is apt to kindle the internal inflammations which often carry off leprous patients.

33. Although I saw several cases of this disease in different parts of Africa, my residence in any one place did not exceed three or four months. I had not, in consequence, opportunities of observing the effects of treatment. But a few years ago I was consulted by a physician who had resided for some years in a warm climate and treated cases of this malady in all its stages. He had had patches of a tawny colour on his extremities, with thickening of the corion, and enlargement of the hair-bulbs and follicles, and loss of the hair of the parts. The patches were slightly insensible; and the sensibility of the toes and feet was somewhat impaired. When I saw him, he had been the subject of the affection during fifteen or sixteen years; and at an early part of the treatment, the patches in the upper extremities had nearly disappeared; but those in the lower continued, the highest being situated in the flexures of, and little above, the knees. He attributed the disease to contagion, and said that he fully recollected the occasion of his infection. The disease had retrograded by his attending to his general health, by his removal to a temperate and equable climate, and by the occasional use of the bi-chloride of mercury with sarsaparilla, or of small doses of FOWLER's arsenical solution, other alteratives and tonics having been employed in the intervals. He subsequently had recourse to sulphur fumigating baths, and to various medicated warm-baths. His pulse was slow, soft, and weak; the impulse of the heart weak; and the complexion pale and unhealthy. The patches in the lower extremities had been stationary for about ten years; but, during that time, a few tubercles had formed in them, had broken, and, after continuing to discharge an ichorous matter, had healed up. The nails of the toes and of the fingers were affected as above mentioned. He complained of dyspeptic symptoms. I first prescribed for him the chlorate of potash in decoction of bark; and, subsequently, put him upon a course of iodide of potassium, with liquor potassa, in the compound decoction of sarsaparilla. After this course was continued about six weeks, the above symptoms began to disappear, and within three months his skin and lower extremities were quite clean. Three years afterwards there was no return of the malady. This case was evidently one in which the *anæsthesia* was the most prominent phenomenon. Notwithstanding the success of these means, I believe, that, in the far advanced state of the malady, the *prognosis* of HOLLER — "Confirmata elephantiasis non curatur" (*De Morb. Inter.* p. 64.) — may be viewed as just.

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I may again state, that in the above article I have confined myself to the consideration of the *Leprosy of the Middle Ages*, which is identical with the *Elephantiasis of the Greeks*, and the *Lepra of the Arabians*, a disease generally prevalent in Europe for some hundred years, and still met with in a few places, and in warm climates; that the *Elephantiasis of the Arabians*, *Elephantia*, *Elephant Leg*, *Barbadoes Leg*, *Egyptian Sarcocele*, &c., is altogether different from tubercular leprosy; and that the *scaly lepra*, the *lepra of the Greeks*, &c., is also distinct from both the foregoing maladies, and is merely a variety of *psoriasis* (*which see*). Doubtless, owing to the numerous causes above stated (§§ 13. 28.), cases of the last-named disease were often aggravated, and others would assume so modified an appearance, that some difficulty, particularly in the early stages of the first of these maladies, might exist in forming a diagnosis; and this difficulty would be increased by the slow progress of all of them, and by the opportunities of examining and observing them during their entire course, being frequently wanting.)

LEUCORRHŒA. — SYNON: — *Fluor Albus*; — *λευκορροια* (from *λευκος*, white, and *ρεω*, I flow); *ῥοος γυναικειος*, Auct. Græc: — *Fluxio vulvæ*, Pliny. — *Ulcus Uteri*, Sennert. — *Cachexia Uterina*; *Menorrhagia Decolor*, Sauvages. — *Menorrhagia Alba*, Cullen. — *Blenorrhœa Uteri vel Vaginæ*; *Fluxio Vulvæ*; *Fluor Muliebris*; *Fluor Uterinus*; *Menstrua Alba*; *Catarrhus Genitalium*, *C. Vaginæ et Uteri*, Auct. Var. —

Hysterorrhœa Mucosa, Swediaur; *Medorrhœa Vaginæ et Uteri,* Frank.— *Fleurs Blanches, Catarrhe Uterin; Leucorrhée, Perte Blanche,* Fr. — *Das Weisse; Weisser Fluss,* Germ.— *Flusso Bianco,* Ital.— *Weakness, White Discharge, the Whites.*

CLASSIF: — 1. *Class;* 4. *Order* (*Cullen*): — 5. *Class;* 1. *Order* (*Good*): II. CLASS I. ORDER (*Author*)

1. DEFIN.— *A light-coloured discharge from the female genitals, varying in hue from a whitish or colourless, to a yellowish light green, or to a slightly red or brown; in consistence, from a limpid serum, to a tenacious ropy substance; and in quantity, from a slight increase of the healthy secretion to several ounces in the twenty-four hours.*

2. Various forms of this disease have been pointed out by writers, according to its presumed seat or source, and to the several circumstances connected with it. Most of the older writers treated it as a consequence of local relaxation, or of general debility. DEWEES viewed it as generally proceeding from local inflammatory excitement; PINEL considered that it was sometimes accidental, constitutional, and vicarious. Dr. CHURCHILL has described it with reference to its seat — as vaginal and uterine. Dr. FERGUSON has divided it into acute and chronic; and Dr. ASHWELL into the common, the inveterate and the symptomatic. Sir C. M. CLARKE arranged the varieties of leucorrhœa chiefly with reference to the character of the discharge, believing that the appearances presented by it are indicative not only of its source, but also of the state of vascular action and of structural lesion in that source. A somewhat similar mode was adopted by J. P. FRANK; but the arrangements of these two eminent physicians were formed more as a means of distinguishing the inflammatory and organic diseases of the female organs, than with reference to the functional disorders of these parts.

3. Leucorrhœa, in every form, and in most of the circumstances in which it occurs, is merely symptomatic, either of functional, inflammatory, or organic diseases of the female organs, or of disorder of the general health. It is unnecessary, therefore, at this place, to attempt to give a full account of the several states in which it appears in practice, as its chief symptomatic forms are necessarily comprised in the articles on the principal diseases of the *vagina* and *uterus.*

4. Leucorrhœa may occur at any period of life — from earliest infancy to advanced old age; but it is most frequent between the ages of 15 and 50. In childhood and early infancy discharges from the vagina and vulva are not infrequent, and are commonly the consequence of irritation or inflammatory action; the mucous membrane of the genitals partaking in the general disposition of mucous membranes to be irritated or inflamed at this period of life, and to furnish a copious mucous or muco-puriform secretion. About 45 years of age the disease becomes less frequent; and after 50 it is seldom observed, unless as a symptom of organic lesions of the uterus. In *childhood* the discharge proceeds from the *vagina* and pudenda, and is a *simple* and *primary* disease; in *old age* it is chiefly from the *uterus* and *os uteri,* and is generally *symptomatic.* During the period of *uterine activity,* it proceeds from either the *vagina,* the *os uteri,* or the internal surface of the *uterus* itself, or from any two, or all, of these situations; and is more frequently a consequence of pre-existing disorder than a primary affection. Owing not only to the situation or source of the discharge, but also to the state of vascular action and vital tone of the vessels which yield it, various appearances are presented by it; and hence, in the difficulty attending the investigation of the exact states of disease producing it, the importance of determining the connection of its several appearances with the particular morbid conditions upon which they respectively depend. The accomplishment of this object is not easy, nor probably can it be attained with great precision; still, if reached with even tolerable accuracy, it furnishes an important aid to the diagnosis, not only of the more primary states of this affection, but also of all the maladies of which this is symptomatic. Hence the attempts of J. P. FRANK and of Sir C. M. CLARKE to arrange uterine and vaginal diseases according to the appearances of the discharges attending them, have not been devoid of great practical utility.

5. It is most evident that, to ascertain the particular *part* or *parts* chiefly or solely furnishing the morbid secretion constituting leucorrhæa, is of equal importance with a knowledge of the state of *vascular action* and *vital tone* in that part; and, consequently, that both these objects should be made the principal pathological points or facts to which medical treatment ought to be directed; and, although both are attended with difficulties, still these difficulties should not prevent the examinations requisite to the attainment of satisfactory information. The *seat* or *source* of the discharge is therefore a matter of the first consideration, and hence becomes the most legitimate basis of an arrangement of its several forms. That the secretion is, in many instances, chiefly *vaginal,* is shown by the circumstance of pregnant females being often the subjects of it; although, even in them, it may partly proceed from the mucous follicles of the *os* or *cervix uteri.* That, again, the discharge may proceed from the inner surface of the *uterus* itself, is shown in some cases of *prolapsus uteri,* and by a variety of circumstances about to be noticed (§ 35.); and, as Dr. FERGUSON observes, there is no reason for doubting that other causes of irritation than those dependent on uterine disorganisation may likewise rouse the inner membrane of this viscus to unhealthy secretion. In severe forms of leucorrhœa, whether chronic or acute, the *cervix uteri* is rarely unaffected, being generally softer, larger, and moister, and not infrequently more sensitive, than natural. The portion, too, of the lining membrane extending through the *cervix* into the *orificium internum* is especially formed for active secretion: the palmæ plicatæ which radiate on it, and which become greatly developed in the progress of utero-gestation, and which pour forth such a quantity of mucus in the progress of labour, prove that it can be the seat of active secretion, and therefore of deviation of its natural function. That the discharge may proceed not only from the cavity of the uterus, but also even from the interior of the Fallopian tubes, appears to be shown by the histories of some cases, as more particularly mentioned by FRANK and others. In the following account of leu-

corrhœa, I shall describe its forms, with reference to their *seats* or *sources*, and to the *grades of action* characterising them.

6. I. Leucorrhœa Vulvæ — *Leucorrhœa Infantilis—Infantile Leucorrhœa.*—i. *Description.*—A discharge occasionally proceeds from the vulva and orifice of the vagina. In *children* it proceeds from the general surface of the external genitals, and more rarely from the vagina, unless in delicate and relaxed children, subject to catarrhal and bronchial affections, attended by a copious defluxion, when it assumes a catarrhal form, or in those affected with worms, or other causes of intestinal irritation. When this form occurs in *adults*, its source is often more partial or limited. In both children and adults it may assume either an *acute* or *sub-acute* inflammatory character, or a *chronic* state. In the *former* state, its commencement is evinced by itching or local uneasiness, and by scalding in passing water; and the surface of the vulva is somewhat swollen and red. This condition is soon followed by a colourless, thin, mucous discharge, which becomes more and more copious, thicker, and of a white or yellow hue. It is sometimes so acrid as to excoriate the surface, and even the skin at the margin of the vulva. There is little or no symptomatic fever. In delicate, sickly, and relaxed children, the symptoms are milder, and are more disposed to the *chronic form*, which, however, may supervene upon the *acute* or *sub-acute* attack. In *chronic* infantile leucorrhœa the discharge is more profuse, milky, or puriform, and is attended by less pain, smarting, or inconvenience. In cachectic, plethoric, and scrofulous children; in those confined in hospitals, or in crowded, ill-ventilated, and low apartments; or in the ill-fed and dirty, the disease may assume a very serious and totally different form, or may give rise to a state of phagedenic ulceration or gangrene, which is noticed in the article Vulva. Occasionally infantile leucorrhœa presents a *catarrhal form*, and is then sometimes associated with slight bronchitic or catarrhal fever, or even with ozæna. In these cases, the secretion from the mucous surfaces generally consists at first of a thin or watery mucus, and is thicker and more glutinous as the affection becomes more *chronic*. It is usually the result of irritation, and proceeds frequently from the vagina as well as from the vulva.

7. ii. *Treatment*. If the irritation be considerable, the parts should be fomented with a decoction of marsh-mallow leaves, or with any other emollient decoction, three or four times a day. After each fomentation, the black-wash, or a weak solution of the sulphate of zinc, or of the acetate of lead, may be applied. When the affection becomes *chronic* or obstinate, a lotion of nitrate of silver, of gr. vj to xij to the ounce of water, is the most efficacious. If the irritation extend up the vagina, a little of the lotion may be injected by means of a small syringe. The patient must be debarred from rubbing, or having recourse to friction of the parts, and be kept quiet. Care ought to be taken that the urine be not retained too long from fear of the smarting felt when passing it; and when smarting is much complained of, the vulva may be fomented or bathed with warm water or poppy decoction after each evacuation. Cooling, diaphoretic and aperient medicines may be given occasionally. The diet should be light and chiefly farinaceous, and the bed-clothes light. If there be any tendency to adhesion of the labia vulva, lint and a little ointment may be placed between them. The parts ought to be duly examined lest such adhesion should form. If they are early detected, they are readily destroyed by forcibly separating the labia.

8. II. Leucorrhœa Vaginæ.—*Vaginal Leucorrhœa.* — i. *Symptoms.* This form of the disease is sometimes *acute*, and very frequently *chronic.*—*A.* In the *acute form*, it is *simple vaginitis*, or inflammation of the mucous surface of the vagina; and, in the more severe forms, is with difficulty distinguished from specific inflammation of the vulva and vagina (see Vagina and Vulva, *Gonorrheal Inflammation of*).—*a.* The earliest *symptoms* are a sense of heat or soreness in the vagina, often with itching of the external parts. To these are subsequently added pain or smarting, with a sensation of tightness as if the vagina were swollen. If the attack extend along the vagina, there is sometimes a feeling of weight or bearing down; or pains extending down the thighs. The discharge, consisting of a thin, acrid, and colourless fluid, appears soon after these symptoms—seldom later than a day or two; but it soon becomes thicker, whiter, or yellowish, more purulent and resembling cream. As the discharge increases, the uneasy symptoms abate; and it frequently continues varying in quantity and appearance, in a more *chronic* or *sub-acute* form. In the early part of the *acute* stage, the mucous membrane is swollen, and the canal of the vagina is diminished; and it is hot and tender; but these soon subside, as the discharge becomes copious. There is no breach of surface, nor erosions of the membrane. In some cases, the labia and vulva are swollen, and more rarely the glands in the groin are enlarged. When the complaint is slighter, the local symptoms are less severe, and little or no constitutional disturbance may attend it; but the more severe attacks are often accompanied with slight rigors or chills, followed by pain in the back and loins, by languor, thirst, and quick pulse, and costiveness, with high-coloured urine, and smarting on passing it.—The *terminations* of this state of the complaint are:—1. In the gradual subsidence of the symptoms and diminution of the discharge.—2. More frequently in chronic disorder, characterised chiefly by the continuance of the discharge, and of the languor.

9. *B.* The *diagnosis* of this state of leucorrhœa from *gonorrhœa* is frequently difficult, particularly when the requisite examinations are not permitted. Sir C. M. Clarke seems to think it impossible in most cases. M. Ricord, however, states, that it is easily determined by the aid of the *speculum uteri.* Whenever the peculiar erosions or minute superficial ulcers of the mucous membrane covering the cervix uteri, which have been noticed by M. Ricord, are discovered, there can be no doubt of the gonorrhœal origin of the disease. These erosions and small ulcers are met with, he states, in nineteen out of twenty cases of the gonorrhœal discharge. An urethral discharge is much more frequent in gonorrhœa than in simple acute leucorrhœa. M. Ricord states that, of two hundred cases of the former, eight in every twelve had the urethra affected. The glands of the groin are also much less frequently enlarged in leucorrhœa than in gonorrhœa. In general, the symptoms are

much more severe, the calls to pass water more frequent, and the pains attending it greater, the extension of the disease to the uterus much more common, with the symptoms indicative of such extension more acute, than in simple acute vaginal leucorrhœa (see art. Vagina, &c.).

10. *C. Chronic Leucorrhœa Vaginæ* — chronic vaginitis of Dr. Churchill — is a most common complaint. From the constitution and state of health of some females, and frequently owing to the continuance of the affection itself, it has been very generally viewed as a consequence of debility local or general — of local relaxation. But a closer attention will often show that the local affection is often the result either of simple or of inflammatory irritation, more especially at its commencement. In many cases also it commences in the acute form already noticed, and passes into the chronic, the acute state being sometimes slight or of short duration.

11. *a.* The *symptoms* of this form of leucorrœha are chiefly, a more or less colourless or whitish and bland discharge from the vagina. In some cases, however, it is of a deeper hue, being greenish, yellowish, or brownish, and occasionally so acrid as to excoriate the edges of the vulva, and in some cases the insides of the thighs. There is scarcely any increase of heat, and little or no pain or tenderness. The inguinal glands are not enlarged. The patient often complains of weakness and of languor, or weariness after exertion, particularly if the discharge be profuse. The countenance becomes pale, and, if the complaint be prolonged, weakness or aching of the loins, and various dyspeptic symptoms are felt. When vaginal leucorrhœa is neglected, it may, especially in its more acute states, extend to the os and cervix uteri, or even to the interior of the uterus. Ultimately it may be followed by prolapsus, or descent of the uterus, and increased constitutional disorder.

12. *b. Diagnosis.*—Chronic vaginal leucorrhœa is distinguished : — 1st. From *gonorrhœa*, by the local irritation being much less in the former than in the latter ; by the absence of sympathetic enlargement of the inguinal glands ; by the whitish or colourless appearance of the discharge ; by the absence of irritation or discharge from the urethra, and of scalding on passing urine ; and by the less frequent calls to pass it : — 2d. From *uterine leucorrhœa*, by the absence of the more prominent and constant phenomena attending that form of the complaint, by its not being increased before or after the menstrual period ; and by the much less severe constitutional disturbance, and much less marked sympathetic phenomena.

13. *D. Causes of the Acute and Chronic vaginal Leucorrhœa.* — *a.* The causes of the *acute* or inflammatory state of this complaint are, chiefly, cold, violence, excessive indulgence ; the circumstances connected with the transition from the virgin to the married state, rape, exertion soon after delivery, inflammation extending from the vulva or labia ; high or rich living, in connexion with habitually sitting on hot cushions ; sitting on very cold seats, on stones, or on the ground, especially if accustomed to warm seats ; irritation from foreign bodies or stimulating injections, or from inflammatory hæmorrhoids, or other inflammatory diseases of the rectum. This form of the complaint is not frequent in unmarried and elderly females ; and it is much favoured by the habits, modes of living, and disposition of the patient.

14. *b.* The causes of the *chronic form* of the complaint are both *local* and constitutional or *general.* The local causes are the acute state of the disease ; irritations of various kinds, as of a pessary, or of excessive sexual excitement ; displacement of the womb ; frequent child-bearing, or abortions ; the irritation of worms in the rectum, hæmorrhoidal or other affections of the rectum ; the local application of cold when unaccustomed to it, or warm or relaxing ablutions or fomentations ; sitting and riding on warm cushions, and excessive indulgence in warm bathing. The *general* and constitutional causes are chiefly full and rich living and a neglect of exercise, favouring the determination of the circulating fluids to the genitals as duly insisted upon by Sir C. M. Clarke ; the influence of cold and vicissitudes of season and weather on the frame, but more especially of warm, humid, and miasmal climates, as evinced among Europeans residing in the East Indies, and in other warm and intertropical countries ; the abuse of spirituous, and fermented liquors ; previous debility and debilitating diseases ; the excitement connected with hot and crowded rooms, with music, dancing, and mental impressions. The period of female life, during which this form of the complaint is most common, is from the appearance to the termination of the menstrual epoch of life — the term of uterine activity. It may however occur either before or subsequently to this term.

15. *E. Treatment.*— *a.* In the *acute state* of vaginal leucorrhæa, local or general vascular *depletion,* according to the age, habit of body and strength of the patient, may be prescribed. If the symptoms be acutely inflammatory this will be the more requisite, and should be aided by fomentations, by vaginal injections of warm water, and by hip-baths. Subsequently injections of a solution of acetate of lead, or of sulphate of zinc, may be resorted to. The patient should preserve the horizontal position, and sleep on a cool mattress, with light bed-clothes ; and the bowels ought to be kept gently open, by means of the cooling saline aperients. Refrigerant diaphoretics may also be prescribed. The diet should be light and spare ; and the beverages cooling.

16. *b. The chronic state* of vaginal leucorrhœa very rarely requires even local depletion. Much more frequently tonics and astringents, either vegetable or mineral, are found necessary, and, when the patient is debilitated or cachectic, they should not be neglected. The *Balsams*, especially copaiva balsam, have been recommended by many. I have often given, with much advantage, the copaiva and other balsams in the form of pills with magnesia ; and if this combination acted upon the bowels, I have added either small doses of *opium* or of the compound Ipecacuanha powder, or of the compound storax pill, with increased benefit. Dr. Dewees has employed the tincture of cantharides ; I have had no experience of it in this complaint. It may probably be advantageously conjoined with the *tincture of the sesquichloride of iron*, which I have often prescribed with benefit in this disorder. Dr. Blundell and others advise the *cubebs* in tincture or powder, and the compound tincture of *benzoin.* These, and other

tonics usually prescribed, are of great service when the complaint is limited to the vagina, and when there is irritation about the urethra; for the cubebs, benzoin, and even the balsams, operate chiefly upon the urinary passages. In many cases, however, they are inferior to the preparations of cinchona conjoined with mineral acids, or the sulphate of quinine. When there are marked debility, relaxation, and pallor, the combination of the sulphate of iron, quinine, camphor, &c., as in the following pills, is very beneficial: —

No. 286. ℞. Camphoræ rasæ, Ferri Sulphatis, Quininæ Sulphatis, āā, ℈j.; Ext. Anthemidis, ℈ij.; Balsami Peruviani, q. s. ut fiant Pilulæ xxxvj.; quarum capiat duas vel tres, bis terve quotidie.

17. Various *local means* have been resorted to with advantage; and, when the uterus is altogether unaffected, and the system is not predisposed to suffer from the sudden suppression of the discharge, they may be prescribed, but with more caution than I have known them to have been prescribed by several practitioners. Of these the most generally efficacious are the *decoction of oak-bark*, or of *cinchona*, or other astringent barks, with or without alum; and solutions of the *sulphate of zinc*, or of *alum*, or of *nitrate of silver*, thrown up by means of a suitable female syringe. The strength of these astringent solutions, usually advised, is frequently too great at the commencement of the treatment. I believe it to be more beneficial, as it is safer, to prescribe at first only one drachm of the first, half a drachm of the second, and a scruple of the third, of these salts to eight ounces of water, and gradually to increase the strength of the solution, according to circumstances. These injections should be employed at first tepid, and the temperature may be gradually reduced. They should be administered slowly, whilst the patient is in the recumbent position, and twice daily. During the treatment, the cold shower-bath, or the cold douche on the loins and hips, will be of service. The patient ought to take gentle and regular exercise in the open air, and attend to diet and to the state of the bowels.

18. Swelling and painful affections of the joints have been mentioned by Dr. Jewell, as having sometimes appeared after the sudden suppression of leucorrhœa by injections. I have met with still more serious, and even fatal, consequences resulting from the use of strong injections, particularly when the uterus has been affected. Some years ago especially such occurrences were not infrequent, for the excellence of a practitioner was too often considered great, particularly by coarse or vulgar minds, in proportion to his boldness or temerity; and even now, when the individual organs and members of the body are taken under the especial protection of their respective physicians — now, when there is a physician for the brain, another for the lungs, a third for the heart, a fourth for the liver, a fifth for the stomach, a sixth for the bowels, a seventh for the urinary organs, an eighth for the female organs, a ninth for the spine, and so on for every prominent viscus, feature, sense, and limb of the human microcosm, — now that the division of labour and the numerical calculations, which are applicable to mechanics, to political economy, and statistics have been transferred to medical practice by the small minds who are incapable of grasping any thing beyond a few palpable entities or obvious truths, or of extending their views to the numerous connections, combinations, and successive states of morbid action, — now when the scientific physician, who pursues his vocation with elevated ideas of its relations to all other branches of knowledge, and of its tendencies and objects, finds the very circumstances which improve his intellects, enlarge his views, and extend his mental vision to the more comprehensive, remote, and influential agents, relations, and results of disease, the strongest barriers he has to surmount in pursuing a successful career of practice, — now when ignorance, presumption, impertinence, absurdity, plausibility, and humbug play their several parts in forming the medical character, and in taking advantage of popular errors in the modes of exercising it, — and now when cant, rant, and quackery in religion, politics, government, and morals have infected the public mind, given currency to worthless pretension, and extended its influence to medical science, — the reflecting will not be surprised, nor will the judicious be disappointed, when they find physicians, whose minds are duly imbued with literature and science, and who believe that the human economy, both in health and in disease, can be successfully studied only as a whole, and in all its parts, relations, and connections, altogether overwhelmed by the crowd of noisy pretenders who obstruct the paths of science, knowledge, and honesty.

19. III. LEUCORRHŒA FROM INFLAMMATORY IRRITATION OF THE MUCOUS GLANDS OF THE OS AND CERVIX UTERI.—This *variety* of leucorrhœa was first distinguished and connected with its source by Sir C. M. Clarke. It is *characterized* by the white appearance of the discharge, by pain in the lowest part of the sacrum, and by the state of the os and cervix uteri.

20. *A.* The *symptoms* are aching or pain at the lower part of the sacrum, or at the os cocygis, and behind the pubis, increased by coughing, or straining, or other actions of the abdominal muscles, and by sexual intercourse. The bladder and rectum are often irritable; and menstruation is occasionally difficult. The discharge, particularly in the more acute cases or early stage, is opaque, white, and resembling in consistence a mixture of starch and water without heat, or thin cream. It is readily washed from the finger after an examination, and is capable of being diffused in water. It is often much thicker than cream, and very tenacious. In this case it does not flow off, but remains in the vagina until exertions to empty the rectum squeeze out at the same time the contents of the vagina. When it becomes more chronic it is often connected with some degree of *vaginal* discharge, by which it is rendered more fluid; and it may be associated with *uterine* leucorrhœa, when it will be attended by the characteristic signs (§ 27.), of that variety. An internal examination detects nothing unusual in the vagina, but the os and cervix uteri feel swollen and are very painful when pressed.

21. Although irritation or inflammatory action of the glandular apparatus of these parts may generally be attended by a white discharge, still it must be admitted that a similar discharge sometimes attends other sexual diseases, without the os and cervix uteri being materially affected. During the earlier stages of this affection, constitutional symptoms are either slight or absent; but, if the

complaint continue long, or if it be associated with discharge from the vagina or uterus, debility, pallor, and some degree of anæmia, difficult or scanty menstruation, costiveness, and various dyspeptic symptoms, commonly result. Sir C. M. Clarke suspects that this state of disease, particularly when neglected, sometimes precedes the more serious organic or malignant lesions to which this part is liable. This is not improbable, especially when the disease occurs, and proceeds unchecked, in faulty constitutions, and where there is a tendency to malignant or structural changes. The character of the discharge in connection with the state of the parts just mentioned, forms the *diagnosis* of the complaint.

22. *B.* The *causes* of this variety are those already mentioned (§ 13.), and more especially cold, irregular habits, excessive indulgences, especially after marriage, great muscular exertions, the suppression of the catamenia, mental excitement, high-seasoned food, late hours, balls, the other forms of Leucorrhœa, &c.

23. *C. Treatment.*— During an early stage of the complaint, *cupping* on the loins or sacrum, abstracting blood according to the severity of the symptoms and constitution, and habit of body of the patient, is generally requisite; and a repetition of it may be necessary. If the catamenia be difficult or scanty, a number of leeches should be applied below each groin a day or two before the expected return of this evacuation. The hip-bath, or fomentations to the lower parts of the abdomen and back, once or twice daily, will often afford additional relief. Injections of tepid water into the vagina three or four times a-day, or of a tepid decoction of poppy-heads, if pain continue or if the bladder be irritable, and the horizontal position, are generally beneficial. The bowels should be kept open by gentle and cooling aperients, such as the tartrate of potash, the super-tartrate of potash with confection of senna, or castor oil. Active purging, especially by resinous purgatives, ought to be avoided.

24. When this complaint becomes *chronic*, its removal is difficult, particularly if it be associated, as it often is, with uterine or vaginal leucorrhœa. In these cases, the horizontal position; frequent vaginal injections of tepid, anodyne, and gently astringent fluids; attention to the secretions and excretions, and particularly to the state of the bladder; regular, light, and spare diet, and alteratives suited to the peculiarities of the case, are usually required. I have seen benefit arise from the super-tartrate of potass, with precipitated sulphur, and either with confection of senna, or with any aromatic syrup, taken every night, so as to procure one copious pultaceous evacuation in the morning. If the bladder be irritable, demulcents, with the compound tincture of camphor and liquor potassæ, will be serviceable, particularly if aided by tepid anodyne injections. If tenesmus occur, a small cupping on the sacrum, and a starch enema, with a little syrup of poppies, will be of service. In other respects, the treatment may be much the same as that advised for uterine leucorrhœa (§ 41.).

25. IV. Uterine Leucorrhœa.— It is sometimes difficult to determine whether the discharge from the female organs proceeds from the vagina or from the uterus, or from both; still a tolerably accurate inference may be drawn, and it is often of consequence, as respects the treatment, that a correct opinion should be formed, as to this point. That the uterus often is the affected organ has been proved by the quantity of whitish or colourless fluid found in it after death, the female having been subject to leucorrhœa during life. Blattin states that, in nine cases out of twenty-four that he examined, the discharge proceeded from the uterus. The older writers believed that the uterus was the source of it in common with the vagina, without, however, stating the symptoms which are proper to the affection of this organ. Many modern authors entertain a similar opinion. Baglivi, Friend, Astruc, Manning, and Leake consider that the discharge proceeds chiefly from the uterus. Denman, Burns, and Hamilton distinguish, although briefly and imperfectly, the uterine and vaginal leucorrhœa. Dr. Locock thinks it difficult to establish a distinction, and does not attempt it. Dr. Blundell treats of vaginal leucorrhœa only; whilst Gardien, Capuron, Dugés, Lisfranc, and Nauche consider the complaint as one chiefly of the uterus. Siebold, Joerg, and Churchill have described the uterine variety at due length, and have insisted upon the importance of recognising the existence of the uterine affection. M. Marc d'Espine has given the results of his examinations with the *speculum* in 193 cases, and they have been referred to by some very recent writers, but without remarking that these examinations were entirely of patients in a venereal hospital — a circumstance that entirely vitiates his data, if made the basis of inferences as to the female community in general. Bearing, however, in mind the description of persons thus examined, the results may be worth recording. In 23 of 193 cases, the uterine orifice was found dry; in 40 there was only a drop of discharge in the orifice; and in 130 the discharge was abundant. The orifice itself was in some quite healthy and pale; in others, red, or deep red; and in some deep red, granulated, and bloody. The following table exhibits the character of the discharge, and the state of the uterine orifice in 111 cases.

	Orifice healthy.	*Orifice reddish.*	*Orifice deep red and granulated.*
Aqueous discharge	7	3	1
Albuminous transp. disch.	30	6	6
Albuminous semi-transparent disch. streaked blue, grey, or yellow	13	19	10
Opaque disch. streaked	3	7	6
	53	35	23

26. That it is important to explain the differences in the local and constitutional symptoms characterising uterine and vaginal leucorrhœa cannot be questioned, and these have been well shown by Dr. Churchill. That the discharge may proceed from both the uterus and vagina, in the same case, must be admitted; and that the vagina is seldom exempt when the uterus is affected, the discharge from the latter generally keeping up some degree of affection in the former, may also be conceded; still, a knowledge of the symptoms attending the affection of the uterus aids us remarkably in determining whether or not this organ is the chief source of the complaint.

27. *A. Symptoms.* Uterine leucorrhœa is a more or less profuse discharge of fluid from the internal surface of the uterus, varying in colour; and is

neither accompanied nor followed, necessarily, by organic change. It may affect females of all ages, from the time of approaching puberty; and it may assume *acute*, *sub-acute*, and *chronic forms;* the first and second of these states occurring chiefly in the young, robust, or middle-aged. It may occur in every temperament and habit of body; but with varying local and constitutional phenomena.

28. *a. Acute uterine Leucorrhœa* is not so rare an affection as Dr. CHURCHILL supposes. I have seen several cases of it; and, in some, the symptoms have been so severe as to amount to inflammatory action, the disease being rather hysteritis with copious discharge from the internal surface of the uterus, than simple uterine leucorrhœa. When gonorrhœa occurs in the female, it is very apt to extend to the uterus, and to simulate an extremely acute form of leucorrhœa, or to cause inflammation of the uterus. Acute uterine leucorrhœa is attended by considerable local suffering and constitutional disturbance: more or less pain or uneasiness is felt between the sacrum and pubis, or in the hypogastrium, and is increased upon firm pressure in the latter situation. The uneasiness extends to the perinæum and vulva; and the patient complains of dragging or uneasiness in the loins, sacrum, hips, and thighs, sometimes with frequent desire to pass water, or with spasmodic retention of it. These symptoms are generally increased by standing, walking, or exertion, and are often accompanied with hysterical symptoms, quickened pulse, and thirst. On examination per vaginam, the cervix uteri is sometimes tender to the touch, or slightly swollen. The discharge varies in quantity and appearance; it sometimes is copious, and evacuated in considerable quantity, affording marked relief, when it becomes scanty or ceases for a time; and it afterwards re-accumulates, and is discharged more abundantly. In these cases, the local and constitutional symptoms, varying much with the severity of the disease, and the state of the patient, indicate inflammatory irritation of, or vascular determination to, the internal surface of the uterus, with increased secretion in this situation. In some instances, the secretion seems to accumulate in the uterine cavity, and occasions an increase of the symptoms, especially of the uneasiness or pain in the vicinity of the uterus, and of the lassitude, malaise, and pains of the joints, before its discharge. In some instances, it has presented a puriform appearance, but it varies in different cases, and even in the same case.

29. *b.* The *sub-acute state* is merely a milder form of the preceding, and differs from it only in the greater mildness of the symptoms. If either this or the more acute state be not cured, it gradually subsides into the chronic, presenting, however, several exacerbations in its progress, particularly before or after the menstrual period, which it may in some cases even replace, with so marked an aggravation of all the symptoms, as to amount to a form of inflammation of the *uterus* described in the article on that organ.

30. *c. Chronic* uterine leucorrhœa is a very common complaint; and, although it occasionally follows the preceding states, it much more frequently commences in slight disorder, or with a mild state of the symptoms above enumerated. As the complaint proceeds, languor, weakness in the loins, head-ache, aching in the joints after exertion, pallor of the countenance, with a darker shade of colour under the eyes, and increased discharge from the genitals, especially at intervals, or shortly before or for some time after menstruation, are commonly present. When it has become persistent, or so chronic as to affect the general health, and especially if it have superseded the catamenial evacuation, the local and general symptoms are much more severe. A constant aching or pain is felt between the pubis and sacrum, with a sense of dragging in the loins, or of weight and occasionally of bearing down in the pelvis.

31. The patient now often complains of head-ache, of languor, and indisposition to exertion, of exhaustion after slight exertion, and sometimes of vertigo and faintness, which, with the head-ache, are owing to debility, and insufficient circulation in the brain. Pain is occasionally felt in the spine, or in the back of the head, and is unattended by intolerance of light and noise. Sympathetic pains are often felt in different parts. The tongue is loaded, sometimes dry, yellowish, pale, sodden, or flabby, and often indented by the teeth. The appetite is impaired or capricious; the bowels and liver become torpid or insufficiently active, the face pallid, the eyes sunken and surrounded by dark circles, and eruptions of *acne punctata* appear on the forehead and face. At last the pulse is small, quick, and weak; the surface is flabby and pale, the ankles swell, and the countenance is waxy, yellowish, or chlorotic.

32. On examination *per vaginam*, the body of the uterus feels somewhat enlarged. The os uteri is a little more open than in the healthy state; but its sensibility is not materially increased. The French practitioners, and a few British, who delight in the parade of this mode of research, inform us that the *speculum uteri* shews the *cervix uteri* pale, slightly rose-colour, deep-red, or spotted; yet I suspect that few reflecting physicians, will consider himself much enlightened by the discovery, or will be induced to prescribe according to the shade of colour thus detected. Yet, the greater the fuss, parade, and seeming pains evinced, with the apparent object of getting at the truth, especially when it lies deep, is not without its influence upon the mind of the patient; and the knowledge supposed to be obtained thereby is considered great in proportion to the trouble and difficulty of procuring it.

33. The discharge varies much in quantity. It is sometimes profuse. In most instances it is colourless and semi-transparent; in others it is opaque, and presents either a yellowish, greenish, or brownish tinge. It varies in consistency, from a very thin or watery mucus, to a gelatinous mucus resembling the white of a raw egg, or to a curdled-like matter in a few instances (HAMILTON, NAUCHE, &c.). It is usually bland; but Dr. CHURCHILL has observed it so acrid as to excoriate the labia and adjoining skin. I have observed this acridity in two instances of the complaint occurring in connection with the accession of the catamenia.

34. Chronic uterine leucorrhœa may *continue* for a very long period, and prove *inveterate*, however judicious the treatment may be. Its *duration* will depend upon the constitution of the patient, and the causes which occasioned it. If those causes continue in operation during the treatment, as is very frequently the case, the complete removal of the complaint is not only difficult, but

nearly impossible, until a change takes place in the patient's habits and feelings.

35. *B. Diagnosis.* — *a.* The *circumstances* more especially *diagnostic* of *uterine* leucorrhœa, are, as Dr. CHURCHILL has justly shown — 1. The occurrence of the discharge in young delicate females at one, two, or three of the monthly periods preceding the evolution of the catamenia; these causes indicating incipient activity of the uterus, with deficient vascular determination. — 2. The discharge of whites during subsequent monthly periods, where menstruation has been suppressed. — 3. An increased discharge during two or three days previous to menstruation, and immediately after it, in those cases where leucorrhœa is more persistent; in these, the leucorrhœa may gradually diminish the catamenia, until it entirely supersedes, or becomes vicarious of it. — 4. The occurrence of menorrhagia in connection with leucorrhœa, the latter preceding or following, or both preceding and following the former, sometimes in great abundance, and occasionally continuing during the intervals between the menorrhagia. — 5. The discharge of whites about the cessation of the menses, and the substitution of it for the menstrual evacuation. — 6. The appearance of leucorrhœa in place of the menses, in chlorotic females, as not infrequently observed. — 7. The termination of abortions, or of the coloured discharge attending them, in leucorrhœa. — 8. A similar transition of the lochia, after delivery, into the colourless secretion. — 9. To these I may add, the copious discharge of the morbid secretions at intervals, and sometimes after an exacerbation of the local symptoms; — and 10. The local and constitutional symptoms characterising this form of the complaint as above described. It should, however, be kept in recollection, that *uterine* and *vaginal* leucorrhœa both often coexist in the same case; that the glandular *irritation* of the *os* and *cervix uteri* (§ 19.), may be associated with either or with both; and that, although vaginal leucorrhœa may often exist alone, uterine leucorrhœa, especially in a chronic form, and when the fluid is at all acrid, will be accompanied with a discharge from the vagina, and occasionally even from the vulva also.

36. *b.* This variety is with difficulty distinguished from *uterine gonorrhœa*, unless the superficial erosions, described by M. RICORD, be present. Still attention to the history of the case, and the greater severity of the symptoms than even in the acute state of the complaint, will indicate its nature. In two cases of uterine gonorrhœa, which were treated by me in 1839 and 1841, and which occurred in recently married ladies, the symptoms were still more acute than those above described, and were consequent upon the affection of the vulva, urethra, and vagina. There were much heat, swelling, and pain in the parts, and in the region of the uterus; the uterine symptoms being exacerbated at intervals, and followed by a copious discharge of yellowish, opaque, puriform matter, occasionally coloured with blood, and generally increased immediately after the exacerbations. The discharge assumed a greenish hue after a time; and the disease subsequently appeared in the usual form of chronic uterine leucorrhœa, presenting many of the features of gleet in the male. The severity, character, and history of the case, and what has already been advanced on the subject, will generally disclose the nature of the complaint.

37. *c.* Inflammatory *irritation* of the *glandular apparatus of the os and cervix uteri* is distinguished from uterine leucorrhœa, by the regular white puriform discharge, and the tenderness of the part on pressure, these characteristics being only occasional or accidental in the latter. The slightest attention to the history of the case will prevent the discharge of the contents of an *abscess* of the uterus, ovary, cellular tissue, or adjoining parts, by the vagina, from being mistaken for this complaint.

38. *C.* The *causes* of uterine leucorrhœa are diversified, and are oftener inferred from various circumstances, than from direct testimony or satisfactory proofs. They are constitutional, local, and mental; and individual causes belonging to these classes of influences may be variously combined in their operations in different cases. Delicate, susceptible, and scrofulous persons seem most *predisposed* to this complaint; and the inordinate indulgence of the emotions, especially of the desires, often concurs with other causes in producing it. Local excitement, venereal excesses, masturbation, and sedentary habits, or indolence, are certainly influential agents in developing it. Fatigue, over-exertion, cold, humid, and miasmatous localities, sedentary occupations, frequent abortions or child-bearing, undue or prolonged suckling, the use of emmenagogues, or of stimulating injections, or of pessaries; a too rich, stimulating, full or heating diet and regimen; the suppression of other discharges; the too frequent use of resinous purgatives; and the irritation of intestinal worms, may severally, or in various combinations, be concerned in producing this form of leucorrhœa.

39. *D.* The *nature* of uterine leucorrhœa can hardly be mistaken. The concomitant signs of debility lead many to infer, that it is a disease of debility, and proceeds entirely from relaxation of the internal surface and parietes of the uterus. This may be the case, in some degree, especially after the complaint has continued for a considerable time. Others again believe, that the discharge is altogether owing to acute, sub-acute, or chronic inflammation of the internal surface of the womb, according to the forms it assumes; and that the local and constitutional symptoms are owing to these states of vascular action in the organ. Probably there are many cases, in which inflammatory action truly exists; and others in which debility, as respects the states of both the internal surface, and of the parietes of the organ, performs its part. Still I believe, that too much is imputed exclusively to the one or the other; and that a *third state*, not necessarily connected with either, although sometimes associated with one or the other, is most frequently concerned in producing the discharge. If the circumstances connected with the occurrence of the complaint be duly considered, there is much reason to infer that it is often owing to the vascular determination to the uterus and female organs, generally consequent upon the excitement or irritation of the nerves supplying these organs or parts; and that such excitement, and the vascular determination consequent upon it, are in some cases carried almost to the pitch of inflammatory action, as in the *acute* states; whilst in others, as in the more *chronic*, it is attended by impaired tone of the extreme vessels in

the internal surface of the organ, and probably also, in some instances, with deficient tone of the parietes of the organ itself. The importance of entertaining correct views as to the nature of the individual cases occurring in practice is manifest; for upon these views must the treatment be altogether based.

40. *E. Terminations.*— When uterine leucorrhæa is neglected, it may give rise to very serious diseases, both local and constitutional. Amenorrhœa, anæmia, chlorosis, sterility, phthisis, and even dropsy, are occasionally consequent upon neglected or protracted states of this affection. These contingencies should influence our *prognosis* in many instances; but generally a favourable result may be expected in the less protracted cases, and when the exciting causes are avoided.

41. *F. Treatment.*— On this subject, the observations of Dr. CHURCHILL are extremely just, especially as regards the use of astringent injections, and agree with those which I have promulgated for many years.—*a.* In the *acute* and *sub-acute states* of the complaint, the local abstraction of *blood* by *cupping* on the sacrum or loins, or by applying a number of leeches below both groins, or to the vulva, when the catamenia are scanty or suppressed, is generally requisite; and, in some cases, a repetition of the depletion is necessary. The hip-bath, and injections of warm water *per vaginam*, are subsequently of service. The bowels should be kept gently open by means of cooling aperients and laxatives, such as those mentioned above (§ 23.); and small doses of camphor, of the liquor ammoniæ acetatis and spiritus ætheris nitrici, to which small quantities either of the vinum ipecacuanhæ or of the liquor antimonii tartarisati, may be added according to circumstances, should be given every four or five hours. After the more acute symptoms have been removed by these remedies, the application of a blister on the sacrum, as advised by Dr. LEAKE and Dr. CHURCHILL, and the repetition of it oftener than once, if the case be obstinate, will be found of great service; or either of the *liniments* (No. 296. 298. 311.) in the APPENDIX may be kept applied, on two or three folds of flannel, as an embrocation.

42. *b.* In the *chronic state* of uterine leucorrhœa blisters on the sacrum, or the terebinthinated embrocation on the sacrum or loins, or on both; the occasional recourse to an enema with about an ounce of the spirits of turpentine; and the sulphate of quinine, with camphor and capsicum, in doses of about two or three grains of each, taken twice or thrice daily, are the means which I have found most beneficial. Dr. CHURCHILL states that the medicines which he has found most useful are—1st, The balsam of copaiba, in pills or otherwise, increasing the dose from fifteen minims; 2d, The sulphate of iron with blue pill, or the compound rhubarb pill; 3d, Decoction of logwood; and 4th. The ergot of rye, in doses of five grains, three or four times a day.

43. The tincture of the sesquichloride of iron with tincture of cantharides; the sulphate of iron with camphor and rhubarb; and the sulphate of zinc with aromatics, &c., have severally been prescribed by me with advantage. *Iodine* has been advised by BRERA, GIMELLE, and SABLAIROLLES, especially in very chronic and obstinate cases. My experience of this medicine leads me to recommend a trial of it when the disease is associated with scanty or difficult menstruation, and when the system presents a pallid, anæmic or chlorotic appearance, and then the *iodide of iron* *, and the preparations of *guaiacum*, will often be of service. — The *ergot of rye* has been recommended by ROCHE, DUFRENOIS, NEGRI, RYAN, and CHURCHILL, and may be given in larger doses than those prescribed by the last of these writers, conjoined with some aromatic powder or spice. It is most serviceable in those cases which are connected with menorrhagia or excessive menstrual discharge, in which cases I have found the *arsenical solution* also productive of great benefit. Besides these, the *ammonio-citrate*, or the *ammonio-tartrate of iron*, the preparations of *krameria* or of *uva ursi*, or of the *pareira brava*, or of the *diosma crenata*, may be employed, especially in the more obstinate cases. M. NAUCHE advises the use of *aromatics;* Dr. HUNT, of the *capsicum;* Drs. FISCHER, ROBERTON, and DEWEES, the tincture of *cantharides;* HECKER, the *cascarilla* bark; LANGE, camphor with oil of *amber* and nitre; MARCUS, the *aromatic sulphuric acid* of HALLER; LETTSOM, the *ammonio-chloride of iron*, in the infusion of *quassia;* HUFELAND the *muriate of lime;* RANOË, *cinchona* with *lime-water;* STOERCK and QUARIN, the *conium*, both by the mouth and in injections; WHITE, the *willow-bark;* and ZACUTUS LUSITANUS, the insertion of a *seton*, or *issues.*

44. An occasional recourse should be had to *aperients* of a stomachic and tonic kind, as the sulphate or super-sulphate of potash with rhubarb, or the compound infusions of gentian and senna; and the operation of these may be aided by suitable enemata. Advantage will often accrue from the use of *chalybeate mineral waters*, in connection with change of air; and from sponging the back, loins, and hips, and lower part of the abdomen, with tepid or cold salt and water, or vinegar and water. Afterwards the shower-bath, the cold *douche* on the loins, or cold sea-water bathing will be of service. Dr. LEAKE advised tonic infusions internally, blistering the sacrum, and the " use of the *Tunbridge*, or *Pyrmont* water for common drink: or the *artificial Spa water*, impregnated with iron and fixed air, as directed by Dr. PRIESTLEY." If these occasioned costiveness, he prescribed senna tea, or imperial drink with manna.

45. If pain or local irritation exist, the preparations of opium, henbane, or conium may be conjoined with the remedies prescribed, or may be administered in enemata. If the acridity of the discharge occasion excoriation of the labia, or of parts in the vicinity, *lotions* containing the acetate of lead, or sulphate of zinc, with vinum opii, may be used. The utmost care should be taken to wash away the morbid discharge by tepid *injections*, with or without small doses of anodynes, or the poppy decoction; yet no benefit will result, but, on the contrary, much risk may be incurred, in this variety of the disease, from employing astringent or stimulating injections *per vaginam.* I have been called to cases where recourse to these had been followed by inflammation of the uterus,

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* This preparation, and the *Iodide of Sulphur*, were made by Mr. MORSON at my suggestion as early as 1826, and prescribed by me in various diseases since that time. The SYRUP is the best preparation of the *Iodide of Iron*, as all others are readily decomposed.

by the appearance of disease in the lungs, and other ill consequences.

46. Strict attention ought to be directed to the states of the digestive functions, and particularly of the bowels; and derangements of the menstrual discharge should be ascertained and removed.

47. The *diet* and *regimen* always require regulation. I have met with cases, particularly in connection with a too copious or too frequent menstrual discharge, which appeared to have been prolonged by a too full and stimulating diet, in connection with other indulgences. In these cases the quantity and quality of the *food* and *drink* of the patient should be strictly prescribed; and a separate sleeping apartment, and cool but sufficient clothing of the loins, hips, and limbs, early hours, and removal from the dissipations of the metropolis, ought to be directed, and continued according to circumstances.

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LICHEN. — Syn. λειχην, *Papulæ*; *Papulæ siccæ*; *Petigo*: *Scabies sicca*, auct. var.: *Scabies agria*; *Scabrities*, *Licheniasis adultorum*, Young. *Exormia Lichen*, Good. *Der Zitterich*, *Flechte*, Germ. *Dartre pustuleuse miliaire*; *D. furfuracée volante poussée*, Fr. *Lichenous Rash.*

Classif. — 1. *Order*; 1. and 2. *Genus* (*Willan*). III. Class. I. Order (*Author*).

1. Defin. — *An eruption of papulæ of a red or white colour, clustered together or irregularly disseminated over the surface of the skin; attended or not with fever, or derangement of the digestive organs; usually terminating in slight desquamation, and very liable to recur.*

2. The term *lichen* was used by Hippocrates, perhaps in the same acceptation as it is at present; but this is uncertain. It was applied by modern writers to impetigo, and various other affections, till the time of Willan, who restricted it to a form of papular eruption, in which sense it has always since been employed.

3. I. Description. — In treating of this disease, I shall follow M. Biett, and his editors, MM. Cazenave and Schedel, in referring to the genus *lichen* the various papular affections generally included under the separate heads of *lichen* and *strophulus*, these differing little but in the period of life at which they occur.

4. According to this arrangement, lichen is divided into *two species*, *L. simplex* and *L. agrius*, and of these the several forms enumerated by authors are considered as *varieties*.

5. i. *Lichen simplex.* This consists in an eruption of minute papulæ of a red colour, often acuminated, but containing neither pus nor serum. The papulæ are distributed irregularly over the surface of the skin, and are attended with a sense of heat, itching, and tingling. They appear first on the face or arms, and in a few days extend to the trunk and lower extremities. The eruption usually lasts for seven or eight days, and terminates in scurf; it is seldom attended with any febrile symptoms unless when unusually abundant. The foregoing description applies to the acute form of lichen simplex. In some cases one crop of papulæ has no sooner disappeared than another is thrown out, and so on in succession for many weeks, or months, and sometimes even for years. The *varieties* of lichen simplex are: —

6. *a. L. pilaris.* In this the papulæ are developed at the roots of the small hairs which beset the surface of the skin. The eruption is almost always of a chronic character, and is accompanied with great irritability of the skin. Bateman says that it is not unfrequently connected with derangement of the digestive organs induced by ardent spirits.

7. *b. L. lividus.* This form is not common, and is nearly confined to constitutions broken down by want and misery, or to a cachectic habit of body. The eruption appears chiefly on the legs, and consists of dusky red papulæ interspersed with petechiæ differing little, if at all, from those of purpura simplex. The disease is often protracted through many weeks by the occurrence of successive erruptions. The papulæ when declining become of a dark brown colour, and finally disappear with slight exfoliation.

8. *c. L. circumscriptus.* Sometimes the papulæ of lichen, instead of being irregularly scattered over the surface, are collected in groups of a somewhat circular shape, having a well defined margin, and the disease then obtains the above name. The patches extend from their circumference by the development of new papulæ, while those at the centre disappear with slight

desquamation. The patches in this manner often coalesce, new ones are formed while the old are desquamating, and the disease may thus be prolonged for an indefinite period. This form of lichen occurs indifferently on the face, trunk, or extremities; it is most frequent in early youth.

9. *d. L. gyratus.* This name has been given by M. Biett to a rare form of the disease, in which the papulæ are arranged in a kind of tortuous stripe or band. MM. Cazenave and Schedel describe a case in which this band, commencing at the anterior part of the chest, passed along the inner side of the arm, following exactly the course of the ulnar nerve, and twisting on itself till it reached the extremity of the little finger. Rayer says he has seen it forming a kind of collar in front of the neck extending from one ear to the other.

10. *e. L. Urticatus.* In this the papulæ are much larger than in the preceding forms, and coalesce into wheals somewhat resembling the sting of a nettle. L. Urticatus is most frequent in children, but is occasionally met with in young persons of both sexes, and in females of more advanced age. It is usually confined to the neck and arms, but may also extend over the trunk and extremities. It sometimes disappears and recurs several times in succession, and is sometimes succeeded by a slight desquamation. It is occasionally attended with slight febrile symptoms, especially towards night, when the eruption causes more irritation. This form of lichen occurs principally in spring and autumn.

11. *g. L. strophulus.* This includes several varieties of papular disease, which are all most frequent in infants at the breast. The papulæ are sometimes red, irregularly scattered, and intermixed with small erythematous patches: this is the *strophulus intertinctus* of Willan and Bateman commonly called the *red gum.* Sometimes the papulæ are smaller but more numerous, and collected in large red patches, constituting the *strophulus confertus* of the above-named authors, and commonly called the *rank red gum.* Less frequently the eruption consists of small red patches of papulæ, which appear and desquamate successively on different parts of the body: this is the *strophulus volaticus* of Willan and Bateman. In other cases the papulæ are of a whitish colour, small, hard, rather elevated and sometimes, though rarely, surrounded with a slight redness: this is the *strophulus albidus.* At other times again the papulæ are of a whitish colour, but much larger, smooth, and glossy; this is called *strophulus candidus.* The two last varieties are known by the popular name of *white gum.* All the forms of L. strophulus are frequently connected with dentition, and derangement of the digestive organs; but they often occur also independently of these sources of irritation, and without any derangement of the general health.

12. ii. *Lichen Agrius*—*αγριος*, *Papula agria*, Celsus: *Lichen ferus*, Good.—This species is characterised by acuminated papulæ of a vivid red colour, very numerous, and accompanied with an erythematous redness, which extends to some distance around the margin of the patches. The eruption is attended with a sensation of itching and burning, which is so severe that the patient cannot refrain from scratching: this, however, greatly increases the irritation, and, by tearing off the summits of the papulæ, occasions small ulcers from which a sero-purulent fluid is discharged, forming yellowish crusts which are detached and replaced by others somewhat thinner. The inflammation often subsides, and the scabs are cast off, in about a fortnight; but sometimes the disease assumes a chronic form; the scabs become successively thinner, and terminate in furfuraceous desquamation. This chronic form is often attended with thickening of the skin, which in inveterate cases becomes indurated, rugous and deeply figured. In this state the disease continues for many months, and may even last for years. L. agrius is often attended with gastric derangement, and in its acute form, with febrile symptoms. It may appear as an original affection, or succeed to some of the forms of L. simplex. It is most frequent in spring and summer.

13. There is a form of L. agrius called *Lichen tropicus*, or *prickly heat*, or *summer rash*—the *Sudamina* of various authors; the *Essera* of Ploucquet—which is very frequent, and a source of intolerable annoyance in warm climates. It usually appears in the shape of numerous pimples of a vivid red colour, not larger than a pin's head, situated on the chest, neck, arms, and thighs, and sometimes on the forehead. It is accompanied with insufferable pricking, itching, and tingling. The eruption often disappears almost entirely when the patient is cool, but the moment he becomes heated by exercise, or by taking any warm or stimulating liquid, it recurs with as much violence as ever. New comers to a warm climate are more liable to it than long residents or natives. A form of lichen, closely allied to the prickly heat, if not identical with it, is sometimes met with in temperate climates, during hot seasons.

14. II. Causes.—Lichen very often occurs without any assignable cause, but it is also frequently attributable to exposure to heat, errors in diet, fatigue, and depressing passions of the mind. L. agrius, in particular, is often occasioned by heat and the abuse of alcoholic liquors. M. Rayer observes that the arms and fore-arms of cooks, founders, smiths, and others, habitually exposed to high temperatures are frequently attacked with lichen simplex or a papular eruption, having the same characters. In children the eruption seems to be often dependent on intestinal irritation.

15. III. Diagnosis.—Lichen may be confounded with various diseases. L. simplex has been mistaken for *prurigo*, *scabies*, and *eczema.* *Prurigo* is distinguished by its papulæ being larger, flatter, and more of the natural colour of the skin than those of lichen; the itching in prurigo is also much more severe than in lichen simplex, and of a different character, being of a burning nature, and not accompanied with the tingling sensations of lichen. *Scabies* will be easily distinguished from lichen by its vesicular character, though a few vesicles are sometimes interspersed among the papulæ of lichen. Scabies appears chiefly on the inner surface of the arms and wrists, between the fingers, and on the abdomen, while lichen affects rather the outer and back part of the extremities; lichen also, frequently attacks the face, scabies hardly ever. *Eczema* may be mistaken for lichen simplex, but only through carelessness, it being easily distinguished by its transparent vesicles. *Syphilitic papular eruptions*

cannot be confounded with lichen as they are indolent, free from itching, and have the characteristic copper colour of venereal affections of the skin.

16. *Lichen agrius*, in its chronic form, is very liable to be mistaken for the corresponding form of *eczema*, and where the skin is thickened, as frequently happens in the latter disease, the diagnosis is extremely difficult. On careful inspection, however, a few of the original vesicles of eczema, or papulæ of lichen, may generally be detected, which, with the history of the case, will determine the nature of the disease.

17. IV. Treatment.—Lichen simplex, in its acute form, usually requires but little treatment. A moderately antiphlogistic diet, a saline laxative, avoidance of exposure to heat, and a few tepid baths being all that is necessary. For allaying the itching, lotions with hydrocyanic acid are highly recommended; slightly stimulating lotions are also serviceable. In those few cases where the disease is attended with fever, gastric derangement, &c., a moderate venesection should be practised, and a decidedly antiphlogistic treatment pursued. The infantile forms of lichen, or *strophulus*, require no treatment apart from that of the morbid states which they may accompany, as intestinal irritation, the disturbances caused by dentition, &c. (See art. Dentition.)

18. *Lichen agrius*, in its acute form, even when not attended with fever is benefited by decided antiphlogistic treatment; and a venesection tends greatly to relieve the irritation of the skin. Leeches applied around the most inflamed patches are very serviceable, but care must be taken to place them quite beyond the limits of the erythematous surface. Other local means are seldom of much use; among the best are emollient poultices applied scarcely lukewarm. Tepid baths are beneficial as in the simpler forms of the disease.

19. The *chronic forms* of lichen generally require a tonic treatment. Decoction of bark with sulphuric acid is often very beneficial, and in obstinate cases the arsenical solution may sometimes be used with great advantage. In the advanced stages, when all acute inflammation has subsided, alkaline and sulphureous baths are among the best remedies that can be employed. An ointment containing calomel and camphor, or the protoioduret of mercury, has been recommended by MM. Cazenave and Schedel, to be applied to the diseased surfaces.

20. The *lichen lividus* may be considered as an entirely adynamic affection resulting from distress and starvation, or from a state of general cachexia, and therefore only to be remedied by improved circumstances, change of air, particularly when occurring in the inhabitants of large towns, by nutritious diet, tonics and restoratives, conjoined with alteratives and deobstruents, according to the peculiarities of the case.

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LIVER—Its Diseases—Synon.—*Hepar*, ἧπαρ; *Jecur*:—*Foie*, Fr.:—*die Leber*, Germ.: *Fegato*, Ital.

1. The importance of the liver in the animal œconomy has been variously estimated in different times and by different writers. The ancients considered this organ to be the origin of the venous system, and the laboratory in which the red blood is prepared. Some recent physiological writers believe that the liver performs an assimilating as well as a secreting function, whilst others contend that it is restricted to the discharge of this latter function. It is, however, impossible to determine by experiments, in a satisfactory manner, how far an assimilating function is performed by this organ; but there is much reason to infer, that it aids in changing the chyle in the portal and the general circulation into red blood—the extent of aid being however doubtful. Admitting, therefore, its chief function to be that of secretion, an additional question arises, namely, how far this function produces, at the same time, an excreting or depurating effect upon the blood, and on the œconomy in general. A number of years ago (in 1815) I entertained this question, and endeavoured to show, that the combination of those elements of bile existing in the blood in order to form this fluid, necessarily tends to depurate the blood; and that the superabundance of these elements in the blood, and the circumstances conducive to such superabundance, generally give rise to an exuberant secretion of bile, provided that the vital endowment and organization of the liver admit of the discharge of its functions,—but to this topic more attention will be directed in the sequel. Thus viewing the functions of the liver to be, 1st. and chiefly that of *secretion*, 2d. and contingently that of *excretion*, 3d. and concurrently that of *assimilation*: and, having mentioned the nature of the functions performed by this organ, although the exact amount of each, especially of the second and third of these, cannot be ascertained, I proceed to consider—1st. The chief causes which disturb these functions. 2d. The principal disorders to which these functions are liable; and 3d. The diseases affecting the circulation and structure of the organ.

2. I. Causes of Diseases of the Liver.—In order to prevent unnecessary repetition, whilst considering the several diseases of the liver, I shall take a general view of the causes which usually occasion them. These causes may produce various effects, or associated effects, according to the temperament, constitution, habits, &c. of the individuals subjected to them; and as respects the liver and biliary apparatus in general, the specific effects of these causes will vary with those and with other predisposing circumstances.

3. *A. Age, Temperament, Diathesis, Habit of Body*, &c.—Disease of the liver very seldom

occurs until *after puberty*, unless in the children of Europeans residing in the East Indies or other inter-tropical countries, and when a change to a more temperate climate has not been adopted for them. It is more frequently observed in the sanguine, sanguineo-melancholic, and irritable *temperaments*; in the scrofulous diathesis; and in a plethoric habit of body, than in others. In young or middle-aged persons the diseases which affect the liver are chiefly acute and inflammatory: at advanced periods of life they are most frequently congestive and structural. The infrequency of the affections of the liver until full puberty has been reached is evidently owing to the much less frequent operation of their exciting causes before this period. In warm climates, diseases of the liver are more common in males than in females who are natives of Europe, owing to the greater exposure of the former to the exciting causes; but in temperate climates, and in this country, as far as the returns to the Registrar General of Births, Deaths, &c. show the fact, these diseases are as frequent, or nearly so, in females as in males, especially in large towns.

4. *B. High ranges of atmospheric temperature and the circumstances connected with them* exert a very manifest influence in occasioning diseases of the liver, although various other causes concur with this in producing the effect. It was long since proved by the experiments of CRAWFORD, LAVOISIER, SEQUIN, PROUT, FYFE, and the author, that the quantity of carbonic acid gas formed during respiration in a given time is much diminished in a high temperature, and under circumstances which lower the vital powers. Drs. PROUT and FYFE observed in their experiments that the changes induced in the blood by respiration were diminished during sleep, by the depressing passions, by fatigue, by spirituous liquors, low diet, and by all depressing agents. I found, in 1817, that the changes effected by the air in respiration in a warm, humid, and miasmatous climate were even to a less extent, and furnished much less carbonic acid gas in a given time, than in those experiments which I performed in an artificially increased temperature in a cold climate; and this further diminution of the changes produced upon the air during respiration in a very warm climate I imputed to the presence of malaria, and to the greater humidity of the atmosphere in this latter, than in an artificial high temperature. If therefore less carbon and its combinations be evolved from the blood by respiration in a given time in a warm climate than in a cold one, whilst the quantity of carbonaceous materials conveyed into the circulation is equally great, it must follow, that this substance will soon be greatly in excess, provided that the elimination of it from the blood is not effected by some other organ. Thus one of two states may be expected to supervene during high ranges of atmospheric heat, or upon the migration of Europeans to inter-tropical countries; namely, that owing to diminution of the changes effected by respiration on the blood, this fluid will either possess highly venous characters, and abound in the elements usually eliminated from it during an active state of the respiratory actions; or it will experience changes equivalent to those produced by active respiration owing to the increased actions of other organs; the diminution of the one function being compensated by the vicarious increase of others. Now, when the office of the lungs is insufficiently performed for the state and wants of the œconomy, those very elements which pass out of the blood by this channel accumulate in it, and furnish the materials for increased biliary secretion; the liver, aided by the skin, the kidneys, and the intestines, performing vicariously an increased function, and supplying the deficiency in the function of the lungs, until the œconomy becomes accustomed to the change.

5. In a high emperature also, when the air is saturated by moisture, a much less quantity of aqueous vapour is discharged from the lungs, than in a cold and dry state of the air; and thus the aqueous part of the blood soon becomes excessive, if it be not excreted more freely by some other part of the œconomy. Hence the fluid excretions of the skin, of the mucous surface of the intestines, and of the liver, become so frequently augmented in warm and humid seasons, and in Europeans residing in hot climates.

6. *C. Climate*, and the various physical circumstances constituting climate and *endemic influence*, have great influence in producing the several functional and structural diseases of the liver. Some part of the influence arising from climates is referable to a high range of temperature, to malaria, and other states of the air; and yet it is difficult to account for the greater prevalence of hepatic disorders in one country than in another, when the physical circumstances constituting climate appear to be nearly equal in both. Thus, in Jamaica, these disorders are neither prevalent nor fatal; and yet in parts of the East Indies, where the same range of atmospheric heat and humidity is observed as in this island, and where other physical circumstances, as sources of malaria, &c. seem nearly equal, they are ten times more prevalent than in it.

7. It is difficult to determine the exact influence of great *dryness* or of great *humidity* of the air in the production of hepatic diseases. Probably more may be imputed to a very high range of temperature than to either. The influence of *malaria* in this respect, and of its combinations with humidity of the air, is probably rather indirect than direct and immediate, periodic fevers being the first morbid effect of this cause; and biliary disease a complication or consequence of these. In many places of India where the range of temperature is very high, and at seasons when the air is very dry, primary acute hepatitis is often frequent amongst Europeans; whilst in warm, moist, and miasmatous localities, the hepatic disease is generally consecutive of other maladies. It would appear from the statistical report of the troops in the West Indies, that diseases of the liver are about three times as prevalent among them as among the troops in the United Kingdom, and occasion nearly five times as high a rate of mortality, whilst Mr. ANNESLEY, and other writers on the diseases of the East Indies, estimate the average annual per centage of these diseases in the East to be treble what it is in the West Indies.

8. There are various localities, particularly in the East Indies, where hepatitis appears to be *endemic*, and where the peculiarities of climate, especially in respect of humidity, temperature, and the usually recognised sources of malaria, seem insufficient to account for the circumstance. How far the nature of the water, and other physical agents may

concur with the states of the air in producing this effect, cannot be determined in the present state of our knowledge.

9. *D. Exposure to the sun's rays, to vicissitudes of temperature*, and to various allied causes, certainly aid in producing biliary disorders. The action of the sun's rays on the head, and on the nervous system generally; exposure to the night air and dews, or sleeping in the open air, particularly after having been subjected to the rays of a very hot sun; sleeping on the ground, as in bivouacs and encampments; sudden alterations or transitions of temperature; and sleeping in the sun, occasion not unfrequently the more acute forms of biliary disease, especially in very hot seasons and climates.

10. *E. Diet and Regimen*, next to temperature and climate, are most productive of hepatic disorders. Eating largely or frequently, especially of animal, rich, and highly seasoned food; stimulating the appetite and palate by a variety of incongruous dishes, and sauces, and spices, and wines, particularly in warm countries and seasons, are most influential causes of these disorders. It is probably owing to such full and stimulating diet, that hepatic diseases are more common in the officers than in the troops serving in the West Indies.

11. The use of *spirituous* or other *intoxicating liquors*, especially in excess, is productive of the diseases of this organ — in warm climates, of the more acute; in temperate countries, of the more chronic and structural maladies — although not, perhaps, to the extent generally supposed; especially when active, continued, or fatiguing duties and occupations are performed. It is probable that some liquors are more injurious than others; that brandy and whisky disorder the liver more than gin and rum; that the strong and brandied wines are more hurtful in this respect than the French and Rhenish wines; and that spirits are injurious in proportion to the degree of concentration or strength in which they are used.

12. It is difficult to ascertain what influence, if any, should be imputed to *unwholesome food*, and to *impure water*. The disorder of the biliary organs which may result, probably, will have some relation to the nature of these causes, to the kind of ingesta, and to the impurities existing in the water. It is to be presumed that, when the ingesta, whether consistent or fluid, is of a septic kind, the functions of the liver will be thereby impaired or otherwise disordered; or that congestion of its vessels, or accumulations of bile in its ducts will be thereby promoted.

13. *F.* If *irritating matters*, whether dietetic or medicinal, taken into the stomach, pass into the portal circulation, they may occasion disease of the liver, particularly if they act conjointly with other causes. It is probable that unwholesome or too rich and heating food, and impure water, act in this way; the influx of an unusual quantity of insufficiently elaborated, or stimulating, or otherwise injurious chyle, and of hurtful fluids, into the general and the portal circulation, irritating and inflaming the secreting structure of the organ, and the portal vessels, or occasioning congestion of these vessels and alterations of the biliary secretion.

14. *Mercurial preparations* exert an undoubted influence in producing disease of the liver, either of an inflammatory or of an obstructive character. Dr. SHERWEN and Dr. DICK first noticed the occurrence of chronic disease of this organ after mercurial courses prescribed for venereal complaints. The most convincing proofs, however, of this effect of mercurials, are adduced by Dr. NICHOLL. Dr. W. THOMSON states, that Dr. CHAPMAN of Philadelphia, ascribed the prevalence of hepatic complaints in his neighbourhood to the use of mercury for the cure of autumnal fevers; some old practitioners remarking that, previously to the introduction of the mercurial practice, hepatitis was scarcely known in it. Dr. NICHOLL remarks that disease of the liver followed syphilis and chronic ophthalmia in a great proportion of the cases treated by mercury.

15. The *absorption of morbid* or *fœcal matters* from the digestive canal, especially during constipation, may act like other irritating and injurious matters already alluded to (§ 13.). M. M. CRUVEILHIER, ANDRAL, and PERCY believe that these and all other irritating matters, when introduced into the abdominal venous circulation, exert an especial effect upon the secreting structure of the liver, and that they act in this way rather than by the extension of irritation from the duodenum along the common bile-duct to the other ducts and parts of the biliary organs, as supposed by many writers. Dr. SAUNDERS states that the diseased structure may be traced in dram-drinkers along the ducts to the gall-bladder and liver, the ducts being so thickened and contracted as not to admit of the passage of bile.

16. *G. Indolence and sedentary occupations* exert a manifest influence in causing the more insidious, slow, chronic, and obstructive diseases of the liver. It would seem that bodily exercises, especially such exercises and occupations as bring the abdominal and other muscles of the trunk into play, promote the portal circulation and the biliary secretion, and still more remarkably the free discharge of the bile into the duodenum. Inactivity, particularly in connection with full living, favours not only congestion of the liver, but also accumulations of bile in the ducts and gall-bladder, morbid states of this secretion, jaundice, the formation of gall-stones, and structural changes of the organ.

17. *H.* The influence of *mental emotions* on the functions of the liver is generally admitted, and is evinced by the occurrence of jaundice or of inflammations of the organ after violent fits of passion, and of functional and structural diseases of it after the continuance of anxiety and other depressing emotions. The mental depression, which often causes biliary disorder, is in its turn increased by the disorder it occasions, until at last the circulation and structure of the liver are more or less altered. Sorrow, anxiety, and other lowering feelings have an evident effect in weakening the abdominal and portal circulation, and in impairing the functions of the liver to the full extent of function I have imputed to this organ (§ 1.).

18. *I.* The occurrence of abscess in the liver after *injury of the brain*, has been often observed and generally imputed to an intimate sympathy existing between both these organs. But there is every reason to believe that the abscesses formed in the liver in such circumstances have often been consecutive upon inflammation of the veins or sinuses within the cranium. Abscess of the liver is sometimes also consecutive of purulent collections in other situations, or caused by the absorp-

tion of morbid secretions or puriform matters from other quarters, and by injuries of the joints, fractures, surgical operations and other occasions of phlebitis, as shown in the article ABSCESS (§ 24, 27 *et seq.*) However, it is not improbable that severe injuries, as concussions of the brain, sympathetically affect the substance of the liver, and develope acute disease of it. There can be no doubt that the exposure of the body, and more especially of the head, to the rays of a hot sun, is often concerned in producing those insidious forms of hepatitis rapidly passing into abscess, so often observed in India, particularly when aided by intemperance, and by exposure to cold and the night air, or by sleeping without, or with insufficient covering. Injuries of the liver itself, blows on the region of the organ and concussions of it, in falls, &c., are also not infrequently followed by the worst forms of inflammation to which it is liable, particularly in the East.

19. *K. Other diseases* are, perhaps, the most frequent causes of affection of the liver, more especially in warm, humid, and miasmatous climates.—*a*. In these the hepatic malady is generally consecutive of periodic fevers and other ailments; whilst in very hot and dry regions, diseases of the liver are more generally primary and acute among Europeans exposed to the sun. Various dyspeptic symptoms precede the more chronic and insidious affections of the liver; and comparatively few cases of intermittent or remittent fever occur in hot seasons, and more especially in hot climates and in India, without the liver becoming prominently affected, if the fever continue but for a short time. In many cases, also, of continued fever, in these seasons and climates, the liver is prominently affected, and the local disease may continue in a chronic or latent form, after the fever has been subdued; or it may be produced, or developed into an acute state, by exposure either to the sun, or to vicissitudes of temperature, or by intemperance, during convalescence or soon afterwards.

20. *b*. Affections of the liver, particularly obstructions to the discharge of bile, are often consequent upon, or otherwise connected with, duodenitis, or with congestion of the villous coat of the duodenum. In some of these cases the common duct may be obstructed by the swelling of the villous coat at the opening of the duct, and thus give rise to jaundice. Some writers suppose that the affection of the duodenum, or of the stomach and duodenum acts sympathetically on the liver, and interrupts or otherwise disturbs the functions and circulation of this organ so as to manifest this and other related phenomena. According to M. RIBES, ANDRAL, and others, disease may be propagated, not only from the villous surface of the duodenum along the interior of the ducts to the liver, as indeed supposed by Dr. SAUNDERS and others, but also from any portion of the intestinal canal along the veins to the portal ramifications in the liver. In this way some recent writers have attempted to account for the occurrence of hepatitis, or rather of puro-hepatis in connection with dysentery: the puriform collections found in the liver in these cases are supposed to have been consequent either upon the passage of puriform or other morbid matters from the bowels into the portal circulation, whereby irritation or inflammation of the ramifications of the portal vessels had been occasioned, or upon a true phlebitis of the mesenteric veins propagated from the origin of these veins in the ulcerated intestines to the portal vein and its ramifications. This subject however, requires further investigation.

21. *c*. The connection of impaired function, or torpor of the liver, with severe or prolonged dyspepsia is very manifest. They are both adynamic affections generally so intimately connected, that the one is soon followed by the other, that of the stomach being most frequently the primary affection. A similar remark also applies to costiveness and constipation. It was supposed by some writers, that accumulations of fæcal matters in the large bowels may so press upon the duodenum and ducts as to prevent the discharge of bile into the intestines; and that morbid secretions or other matters may so obstruct the opening of the common duct as to produce the same effect. There can be no doubt that, if the causes assigned as productive of the obstruction, were ascertained to be sufficient to occasion it, and if the existence of these causes in such a grade of sufficiency was satisfactorily proved, they should be viewed as efficient agents in the developement of hepatic disorders; but, of themselves, it is probable that they are not sufficient or frequent causes; and that they only concur with other circumstances, and are most influential when the bile itself is inspissated or does not flow readily along the ducts.

22. *d*. Of all diseases, the most intimately connected with hepatic abscess are *dysentery* and *chronic diarrhœa*, particularly in the East Indies. From the accounts given of this association of disease as well as from intimate observation of the cases themselves, it is most difficult to determine which is the primary affection. I believe that either may follow the other; that both may be coëtaneous; and that more frequently the bowel complaint is the consequence of puriform collections silently and insidiously formed in the liver, without giving rise to symptoms so severe as to alarm the patient, and to cause him to relinquish his avocations, or so marked as to enable the physician to determine the nature and seat of the malady. As soon, however, as matter is formed, or collected to an extent calculated to affect the organic sensibility of the organ, particularly in its surfaces, and to awaken the sympathetic sensations of adjoining or related parts; or when the local irritation, or the passage, by absorption of a portion of the contents of the abscess into the circulation, then indications of its existence are manifested — in the first case, by pain, uneasiness, &c.; in the latter, by hectic, chronic diarrhœa, or dysenteric symptoms. The history of many of these cases will show various dyspeptic and slight biliary disorders to have been complained of, weeks, months, or even years before the bowel complaint had occurred; and in some of the cases, where the hepatic affection seemed to follow the removal of the dysenteric attack, it had evidently existed previously to the disorder of the bowels, the removal or suppression of the one rendering the other, which had pre-existed, merely more prominent.

23. *e*. The occurrence of disorders of the liver consecutively upon diseases of the heart and lungs has been acknowledged since the connection was insisted upon by PAISLEY, CORVISART, and POWELL. In these circumstances, particularly

when the heart is diseased, congestion of the hepatic veins, often extending to the portal veins, is the first and chief disorder produced. The frequent connection of fatty degeneration of the liver with pulmonary consumption is remarkable, and will be considered hereafter. Many writers have noticed the co-existence of diseases of the liver and of the brain, and have been at a loss to account for the circumstance. The co-existence is frequent, but not uniform, nor even general. It is sufficiently common, however, to deserve explanation; and is observable both when the mind is deranged and when it is unaffected. When we consider that both the liver and the brain are supplied, as respects their organic actions and functions, only with ganglial nerves; that these organs are hence intimately connected through the medium of this system of nerves; and that the circulation of both is peculiar, and in some degree removed from the circle of the general circulation, and is to a great extent influenced by the ganglial formations supplied to each, we cannot be surprised at observing disorder and organic change often co-existing in both, seeing that their circulation and functions are actuated by the same system, and by the powers exerted by that system; disorder of one part being soon followed by disturbance of other parts intimately related to it.

24. *f.* Suppression of accustomed discharges—of the hæmorrhoids, or of the catamenia, or leucorrhæa, &c.—is sometimes followed by hepatitis. The disappearance, or drying up of eruptions, ulcers, &c., and the closing of sinuses, or fistulas, as fistula in ano, and operations for hæmorrhoids or fistula, have been also sometimes followed by diseases of the liver.

25. Many of the causes above adduced may be insufficient singly to produce well-marked disease of the liver, although each may predispose to it, or even excite it, when acting in an intense form, or without intermission. More frequently two or several of them are combined, or act conjointly or in close succession, in developing the morbid effect: and so various are such combinations and successions of these causes in different persons, circumstances, and localities, that it is impossible to instance even a part of them.

26. *L.* Of the *several races* or *varieties of the human species*, the *white or fair races* are the most prone to diseases of the liver, and more especially to that state of disease which passes insidiously and silently on to abscess. Of these races, the sanguine temperament, the fair complexioned, and the scrofulous diathesis, the last especially, are most liable to this extremely unfavourable form of hepatitis, particularly during very hot seasons, or after emigration to a hot climate. On the other hand, the melancholic and the irritable temperaments, and the sallow and meagre habits of body, are the most liable to experience the slighter or functional disorders, and the more chronic structural lesions, of the liver. Numerous exceptions, however, occur to these general rules. — Owing to the predisposition arising out of temperaments and constitutions, hepatic complaints are often hereditary, or prevalent in the branches of the same family.

27. The immunity of the dark races, particularly of the negro, from diseases of the liver, is very remarkable, even in climates where these diseases may be considered endemic. I have, in other works, ascribed the immunity of these races from these and other maladies to the several points of differences existing between their organisation and that of the white races. The former are constituted to live in a climate injurious to the latter — in warm, humid, and miasmatous regions; whilst the fair races are organised so as to endure without material injury the severities of winter, the changes of the seasons, and the vicissitudes of weather, under which the great mass of the darker races would sink. In the negro — the extreme grade of the dark varieties—the liver is small and performs a more limited range of function, compared with the fair races. The same remark applies to the lungs; for I ascertained by experiments made in a hot climate many years ago, that the lungs of a negro furnish much less carbonic acid gas in a given time than those of an European of the same size, and similarly circumstanced. The skin of the dark races, however, performs a compensating function — one in some respects subsidiary to both respiration and biliary secretion, particularly as regards the depuration of the blood. The brain also in them is better protected by nature from the injurious influence of a vertical sun, than that of the fair races, and is less liable to experience the effects of such influence, either in the more sudden and severe forms of sun-stroke, or in these less appreciable states and affections of innervation, which disorder the hepatic functions more severely than even the cerebro-spinal influence and loco-motive powers.

28. *M. The causes which produce hepatic disease in Europeans in warm climates* have been already noticed; but there are certain combinations of them that may be briefly enumerated. — It is generally overlooked by medical writers, and is certainly neglected by those chiefly concerned, that nature intends the *food* and *clothing* of the inhabitants to be suited to the circumstances of the climate in which they live. The suggestions arising out of our sensations, reflections, and observations, are unheeded in the quick succession and crowding of contending desires, and habits and fashions; and health is sacrificed, and life endangered, to pamper the palate, and to follow the mode rather than adopt what reason approves of, and our feelings suggest. The full, rich, and stimulating animal diet, which might be required, and readily disposed of in cold countries, by persons engaged in active avocations, is no longer suited to the European constitution when removed to a hot climate, and the more injurious does it become the more frequently it is indulged in, and the more it is accompanied with the use of the heating wines and other fermented liquors suited only to northern or temperate regions. The clothing also of those who leave the latter to reside in warm climates is rarely adapted to the novel physical circumstances in which they are placed. The head of the European, which nature has protected sufficiently in his native climate, is dangerously exposed within the tropics, and requires a greater protection than is generally given it. In this particular as well as in several others, foolhardiness is characteristic of many. The common error is a total disregard of those accommodations of clothing to the differences and changes of temperature which often occur with remarkable rapidity in intertropical countries, and are more hurtful in these than in temperate climates.

29. Intemperance of all kinds, but particularly

in eating and drinking; exposure to the sun, and subsequently to the night air, or to cold or wet, especially when the body is perspiring: copious draughts of cold fluids during fatigue, or in a state of perspiration; repletions of the stomach after long fasting; addiction to spirituous liquors; sleeping with insufficient clothing after fatigue and exposure to the sun, particularly either upon or near the ground; disappointments, grief, and the depressing passions generally, and the diseases above mentioned (§ 19. *et seq.*), are the most influential causes of the diseases of the liver in hot countries; and those to which soldiers and sailors in those climates are most exposed.

30. II. Of the functional Disorders of the Liver. — Under the head of functional disorder may be comprised all those conditions of the biliary secretion which differ from the healthy state, and lead to further disease. These conditions generally are manifested in the quantity and quality of this secretion, and, although connected with changes in the state of the blood circulating in the liver, are not necessarily allied to inflammatory action or structural change; these latter states, however, being also and necessarily attended by alterations from the healthy function of the organ. This latter circumstance — this frequent dependance of disordered function upon alterations of vascular action, or of structure, or of both — requires from the physician the utmost care in determining the state and amount of disease. Even when the disorder of function is ascertained to be independent of these more serious changes, it should be recollected that it often passes into inflammatory states, or even into structural lesions. Indeed, these latter generally proceed from this source, either immediately upon the first functional disorder, or after repeated or prolonged attacks of it. The chief disorders which fall under this head are — 1st. Diminished secretion of bile; — 2d. Increased secretion of bile; — and, 3d. Secretion of morbid or altered bile. To these might be added, accumulations of bile in the gall-bladder and ducts; but as these arise from various circumstances, both functional and organic, and are followed by several changes both in the bile itself and in the parts containing it, this subject is more appropriately considered in the articles Gall-Bladder and Ducts, and Concretions, Biliary.

31. The *three* functional disorders of the liver about to be considered have been usually denominated *bilious*, without, however, any precise idea being annexed to the term, which has, even by professional persons, been applied to a deficient secretion of bile equally with an increased secretion. These disorders may be referred to two principal pathological conditions: — 1st. The state of the blood, as furnishing the elements of bile; — and, 2d. The state of organic nervous or vital influence, as actuating both the hepatic circulation and the biliary secretion.

32. I have contended above (§ 4—8.), and in other works, that the blood abounds, more or less, according to modes of living and ranges of temperature, with the materials for biliary secretion. According to such abundance or deficiency, and to changes experienced by the blood during its circulation in the organ, so may it be supposed that the bile will be either abundant, or deficient, or altered.

33. That the vital or nervous influence will act not merely *dynamically* in promoting or impeding the circulation and the secreting function of the liver, but also *qualitatively*, may be admitted, although this latter change may depend more upon the state of the blood than upon the condition of the nervous or vital power. Much will depend, however, upon the states of intimately allied or connected organs, especially in modifying the vital power and functions of the liver. The states of the stomach are often influential in promoting or impeding biliary secretion. When the vital actions of the stomach are energetic, those of the liver are usually co-ordinate with them; and, when these actions are impaired, the functions of the liver equally suffer. Hence the general association of torpor or inactivity of the liver with indigestion; and the frequent supervention of biliary disorders, even of a severer character than these, upon dyspeptic complaints, especially when the latter are neglected and prolonged. Disorders of the duodenum have a similar, and sometimes even a more remarkable, influence on the functions of the liver; and, besides occasioning sympathetic effects, such as those which are produced by the stomach, they sometimes completely interrupt the passage of bile into the intestines, thereby disordering the secreting function, and the secretion itself; and, if the interruption continue, ultimately affecting the circulation and structure of the organ.

34. i. Diminished Secretion of Bile. — *Torpor of the Liver — Torpor of the Biliary Organs.*

Classif. — I. Class. I. Order (*Author*).

35. Defin. — *An irregular or costive state of the bowels, the stools being insufficiently coloured with bile; flatulency and various dyspeptic symptoms; a sallow or muddy appearance of the countenance; and lowness of spirits.*

36. *A.* The *circumstances more especially occasioning* impaired action of the liver are, the neglect of exercise; sedentary occupations; indolent indulgences; exposure to cold, humidity, or malaria, after fatigue or excessive perspiration; copious draughts of cold fluids; habitual over-excitement of the stomach and liver, from eating and drinking rich and heating articles, particularly when these are suddenly withdrawn; and a neglected state of the bowels, or accumulations of secretions and fæcal matters in the intestinal canal. When the duodenum and intestinal canal are weakened and when mucous or other secretions accumulate on their villous surface, the ingesta and bile poured into them fail of exciting their healthy action. Hence the emulgent effect usually produced on the ducts from continuity of surface and consent of action is inefficiently performed, if at all; and thus a similar state of function to that existing in the digestive canal is extended to the liver. Habitual inattention to the due evacuation of the bowels thus becomes one of the chief causes of inaction of the biliary organs.

37. *B.* The *symptoms* of impaired action of the liver are not always very manifest; and it is often very difficult, or even impossible, to determine, even when these symptoms are well marked, whether or no they depend merely upon diminished energy, or upon change of the structure of the organ and of its appendages, unless we are acquainted with the patient's habits, and with the nature of his former ailments. When the patient complains — after

having enjoyed good health, or without having experienced on former occasions either acute or chronic affections of the liver or stomach, or other severe disease likely to have implicated the former organ, — of dyspeptic symptoms, with a costive or irregular state of the bowels, the stools being pale or clayey, and the urine dark or high-coloured, or thick, after having cooled, — of want of appetite, drowsiness or pain over the eyebrows, lowness of spirits and hypochondriacal feelings, — of flatulency of the stomach and bowels, a foul and loaded tongue, and a bitter or disagreeable taste of the mouth, particularly in the morning, — and of a dark, sallow, or muddy appearance of the countenance and skin, but without any pain, febrile movement towards night, or thirst, or chills followed by heat or hardness of the pulse, or fullness or tenderness in the region of the liver, — it may be reasonably inferred that the functions of the liver are simply impaired.

38. When, however, the above symptoms occur in a person who has lived intemperately as respecting either eating or drinking, or who has resided long in a warm climate, or who has suffered former attacks of hepatic disorder or protracted periodic fever, it may be inferred that the impaired function is associated with congestion, inflammatory action, or with some organic lesion of the biliary apparatus, more especially if any or all of the symptoms last mentioned be present.

39. When the vital energy of the biliary apparatus is impaired by any of the above causes, or exhausted by drunkenness, dissipation, &c., bile is formed either in diminished quantity or of depraved quality, and sometimes it is both the one and the other. When this state exists, and particularly if it have been of considerable duration, congestion of the portal vessels should always be dreaded, and its existence, as far as may be ascertained, ought to be carefully inquired after. Portal congestion, having supervened upon torpor of the secreting function of the liver, the two morbid states tend to perpetuate and increase each other, by mutual reaction, until enlargement of the organ, or chronic, or even acute, attacks of inflammation of its substance take place, according to the concurrence of exciting causes, and the predisposition arising out of the diathesis or constitution of the patient.

40. Torpor of the liver, then, may arise simply from a depressed or exhausted state of the vital energy of the organ; or from this state associated with accumulations of bile in the gall-bladder and hepatic ducts, or with congestion of the blood-vessels of the organ, or with both; the former disorder gradually inducing, and becoming complicated with, the latter derangements. Impaired secretion of bile is generally associated also with dyspepsia; and it often originates in that disorder, particularly in protracted cases. In many of these instances, the bile is not merely diminished in quantity, but it is also changed in its appearance and properties: it becomes viscid or otherwise vitiated, so as to flow with difficulty along the ducts, thereby causing a loaded state of them, obstruction, and ultimately vascular congestion, biliary concretions, and organic lesions.

41. It is comparatively rare that inaction of the liver is so complete as to amount to an entire suppression or arrest of its functions, unless in pestilential cholera, and in organic lesions of the organ and biliary passages. When the vital action of the liver is so far suppressed as to render it incapable of combining the elements of bile into this fluid, however scanty or morbid, the circulation of these elements or materials in the blood, as shown in the articles Blood (§§ 115—121.), and Disease (§ 97.), becomes most injurious and vitally depressing to the economy. This is fully shown in the pestilential malady just mentioned, and even in other cases and diseases, where the actions of the liver are not entirely suppressed. In many of these latter, (particularly when the inaction approaches and proceeds more gradually than in that malady) other organs, as the kidneys and skin, seem to compensate, in some degree, for the torpor of the liver, and to eliminate from the blood a portion of the injurious materials accumulated in it, owing to this cause. The connection of this subject with the functional disorders of the gall-bladder, more particularly with *inaction of, or accumulation of bile in, the* GALL-BLADDER AND DUCTS, with BILIARY CONCRETIONS and with JAUNDICE, will suggest a reference to these articles.

42. *C. Treatment.*—The means usually resorted to in this and in warm climates, in order to increase the biliary secretion, are mercurials in some form or other, and particularly calomel and blue-pill, given at bed-time, and followed in the morning by a saline or other aperient draught. Various modifications of this treatment have been advised—in some cases large doses of calomel, in others moderate doses of Plummer's or of blue-pill at bed-time, frequently saline purgatives, often a combination of tonic infusions, with the infusion of senna, and with salts. Each of these may answer the purpose, if judiciously employed. It is generally advantageous to combine Plummer's pill with soap; and to give, at the same time, full doses of taraxacum. Different modes of accounting for the action of mercury in these cases have been adduced. Some suppose that the mercury has the effect of stimulating the biliary apparatus; others believe that it acts only in the digestive mucous surface, by removing mucous colluvies from it, and exciting it so as more fully to emulge the biliary ducts. It would seem, from experiments tried on some of the inferior animals, as well as from the well known effects of the preparations of mercury, that they diminish inflammatory irritation of the villous surface of the stomach and duodenum, and carry off mucous matters from the intestinal surface. In this way they may diminish congestion around the orifice of the common duct, remove spasm or irritation of the ducts, and thereby favour a free discharge of bile into the intestines.

43. The next most efficient means of procuring a free secretion of bile, especially after mercurials have been prescribed, are the *bitartrate of potash* with confection of senna and extract of taraxacum; but the potash should be given in large doses, or in smaller doses with the biborate of soda. Instead of exhibiting mercurials in so large or frequent doses, as have been usually prescribed, these medicines, or those about to be mentioned, should be resorted to, and a full or decided dose of a mercurial ought only occasionally to be given; but generally it should be fairly, but cautiously, tried in the first instance. In some cases, Plummer's, or the blue pill may be given every night, for some days, with the purified extract of

aloes and soap, and a saline, or a bitter stomachic aperient in the morning.

44. If these means fail, and if no symptom appears to contra-indicate the practice, an *emetic* may be exhibited, and its operation promoted by diluents or the warm infusion of chamomile flowers, with bitartrate of potash and biborate of soda dissolved in it. Subsequently *blisters* may be applied over the hepatic region; or the *nitro-muriatic acid* may be given internally, and also employed in the form of a lotion over the hypochondriac and epigastric regions. After blistering, I have seen advantage derived from wearing a large plaster over these regions, consisting of the emplastrum picis compositum and emplast. ammoniaci cum hydrargyro. In cases of torpor of the liver unconnected with congestion of the blood vessels, gentle tonics, with alkalies, taraxacum, iodide of potass, or aperients, may prove beneficial; but when the torpor results either from a passive engorgement of the biliary ducts, or from congestion of the portal or hepatic veins, recourse to these might be injurious, by developing chronic or acute inflammation of the organ. Much advantage, however, will be often derived, when the torpor is thus associated, from the continued use of deobstruent aperients, and an occasional recourse to a full dose of calomel, followed by a cathartic draught, with the view of carrying off the bile accumulated in the ducts, and the viscid secretions often adhering, in these cases, to the villous surface of the intestines. In these latter circumstances, the bitartrate of potash and biborate of soda, conjoined with other medicines according to the peculiarities of the cases, are often beneficial.

45. It is sometimes requisite to conjoin with the medicines employed to excite the liver, a substance which may prove a substitute for the bile which is deficient. I have for many years prescribed inspissated ox-gall in this way, usually with the aloes and myrrh pill, or the purified extract of aloes, soap, taraxacum, blue pill, &c.

46. Several of the deobstruent and aperient mineral waters, as the *Cheltenham*, *Beulah*, *Seidchutz*, *Pulna*, or other waters, may be taken in order to excite the action of the liver, and remove obstructions in the ducts. The causes of the disorder should be avoided; and change of air, travelling, and horse-exercise recommended.

47. ii. Excessive Secretion of Bile. — *Increased Biliary Secretion.*

Classif.—II. Class. I. Order. (*Author in preface.*)

48. Defin.— *Copious, fluid, alvine evacuations, highly coloured with bile, often preceded by griping, by nausea, and sometimes by vomiting, or attended by this latter, and acceleration of pulse.*

49. Excessive biliary secretion is more frequently inferred from circumstances than proved by unequivocal evidence. Accumulations of bile may have formed in the gall-bladder and ducts, and when their discharge into the bowels has commenced, they may so excite increased exhalation from the intestinal villous surface, and so deeply tinge the stools, as to give rise to all the phenomena of increased secretion when only an increased discharge of previously obstructed, or accumulated bile has taken place. In this climate, particularly in summer and autumn, these occurrences are common, and are merely minor grades of the same pathological states, which, in a higher degree constitute bilious diarrhœa or bilious cholera (*which see*). Still, in warm climates, and in warm seasons in cold or temperate countries, a more than usually abundant secretion of bile sometimes takes place, without amounting to severe diarrhœa, or to cholera; the stools being fluid, bilious, and copious, and continuing in this state for a considerable time. This occurs more frequently in persons who have recently removed to a hot climate, owing to the cause above assigned (§ 4—8.). It is evident from this, that excessive biliary secretion belongs to the same category with the disorders just mentioned, and that its pathology and treatment involve the same principles as they.

50. Dr. Abercrombie suspects "that the term bilious *stools* is often applied in a very vague manner, to evacuations which merely consist of their fæculent matter mixed with mucus from the intestinal membrane." There can be no doubt of the vague manner in which pathological phenomena are observed by many, even of those who are the most critical, and in appearance the most precise. But no one who has seen bilious evacuations could confound them with those Dr. Abercrombie has mentioned. Those who are conversant with the diseases of hot climates well know that copious and frequent discharges of bile, the stools sometimes containing a large proportion of this fluid, simply from excitement of the organ, caused by the abundance of the biliary elements in the blood, not infrequently take place, and that similar discharges occur during bilious fevers, and when determination of blood to the liver is favoured by circumstances increasing or accelerating the abdominal venous circulation, or by causes irritating the liver itself, and even by the irritation produced by an abscess in a portion of the organ.

51. There is the best reason to suppose, namely, the evidence furnished by observation, that an augmented secretion of bile sometimes follows the more violent mental emotions, and occasionally precedes and even attends certain states of inflammation of the organ. It sometimes also attends or follows those affections and diseases, in which the requisite changes are not effected by respiration on the blood.

52. Respecting the *causes*, *symptoms*, and *treatment* of increased biliary secretion, it is unnecessary to add to what has been already stated, both in the foregoing remarks, and in the articles bilious Diarrhœa, bilious Cholera, and Gall-Bladder.

53. iii. Vitiated Biliary Secretion—*Morbid bile.* — *A.* There is every reason to suppose that the bile is not frequently possessed of morbid appearances or properties at the moment of, or just after, its secretion; but that it acquires these properties after it has passed into the hepatic ducts and gall-bladder, and that, during its remora or accumulation there, such properties are developed, either by the reaction of its elements or components on each other, or by the absorption of its watery or more fluid parts. That, however, the bile is sometimes secreted with remarkably altered appearances and properties, is proved by the pale watery and albuminous state of that which is found in the gall-bladder and ducts of a few cases after death; but these alterations are only met with in connection with chronic structural

change of the organ. That the bile often presents a very dark greenish or greenish brown hue, or is tar-like in consistence and colour, and thicker and more acrid than natural, is indisputable. These characters are often presented even in the evacuations, but more unequivocally in dissections, the gall-bladder and ducts being loaded with bile of this description. Although it probably acquired these characters during its accumulation in these situations, yet it is not impossible that it possessed them in some degree from the first, especially as bile of this kind is often secreted after indications of an unusual accumulation of the elements or materials of biliary secretion in the blood have been manifested.

54. It is unnecessary to adduce proofs of vitiation of the bile whilst it still remains in the system, as this has been proved by chemical analysis, and by the irritating effects sometimes produced by it when applied to several tissues, and even to the skin, although protected by the cuticle. These more vitiated or morbid conditions are, however, observed chiefly in malignant or pestilential maladies; the slighter modifications only of the secretion occurring in the more simple functional and inflammatory states of the organ. It is probable, that, in cases of congestion of the portal and abdominal venous circulation, the bile is secreted with modified characters, and that it then often assumes a darker appearance, and more acrid properties.

55. A *vitiated* state of the bile may attend either a *deficient*, or an *increased* secretion of it. The former association is in a few instances observed in dissections; what has been inferred to exist during life being actually proved by inspection after death. An increased, and at the same time a morbid or vitiated, secretion and discharge of bile is observed upon recovery from pestilential cholera, when, owing to the suppression of the vital actions of the liver, and to the abdominal congestion, the materials of biliary secretion have accumulated in the blood, and the restored function of the organ, acting upon a redundancy of these materials, furnish an increased as well as modified supply of this fluid. A similar state of the bile is sometimes observed after partial asphyxia, and during or after an asthmatic attack, particularly when the functions of the liver are roused by chologogue purgatives. In these cases the obstructed function of the lungs having caused an accumulation of the elements of bile in the blood, the liver, when its energy is restored, combines them into this fluid, which, owing to the redundancy of these elements, is not only increased in quantity, but is also more or less modified in its characters.

56. It is, however, most probable that the bile becomes vitiated in the majority of cases, or chiefly after it has accumulated in the gall-bladder and hepatic ducts; that the acrid properties it there acquires sometimes promote its discharge into the duodenum; that its action upon the intestinal mucous surface greatly increases the secretions and exhalations in this situation; and that its deep tinge is more or less imparted to the fluid stools thus produced, the secretion and discharge of bile thereby appearing greater than it really is.

57. *B. The Treatment* most appropriate to vitiated, morbid, states of the bile, should depend upon the phenomena attending it. If it give rise to diarrhœa, griping, &c. diluents, demulcents, the warm bath, and other means advised in the article Diarrhœa (§ 27.), small doses of ipecacuanha with alkalies, anodynes, and gentle aperients are often of service. If the irritation proceed so far as to give rise to symptoms approaching to bilious cholera, the means then advised should be employed.

58. iv. Neuralgic Affection of the Liver.— Synon. — *Hepatalgia*; *Dolor Hepatis*; *Colica Hepatica*, of various Authors. — *Severe Pains of the Liver.* — This affection has been noticed by Avicenna, Rolfinck, Zacutus Lusitanus, Bartholin, Bianchi, and several other writers; and recently by Grosmann, Andral, and Dr. Stokes.

59. It consists of very severe pain in the region of the liver — which is not accounted for by any organic lesion of this viscus or of its excretory ducts that can be discovered during life or after death — of *severe pain, without fever, swelling, or other indication of structural disease of the liver.*

60. It is most frequently observed in the nervous temperament, and in hysterical persons. Dr. Stokes states that he has met with it only in females, and that in some of those a decidedly hysterical tendency existed, whilst, in others, this disposition was not indicated. In one case, it seemed connected with what has been called "spinal irritation."

61. *A.* The *principal symptom* of this affection is the pain, which is more or less constant, but subject to occasional and violent exacerbations, in some cases; and, in others, are more intermittent, the state of health being tolerably good during the intervals. The exacerbations, or returns of the pain, are often owing to mental emotions, over-excitement, derangement of the bowels, fatigue, irregularity of the catamenia, or the return of this discharge. The pain, during its exacerbations, is apparently more intense than in acute hepatitis, and is generally attended by tenderness of the hypochondrium and epigastrium. There is sometimes, also, slight jaundice; but generally there is no sign of structural lesion of the organ, except pain. Neither fever, nor swelling, nor thirst, nor biliary obstruction is present: the tongue is not loaded; the urine is not dark, turbid, or scanty; the stools are natural, or not materially disordered; and the functions of the stomach not greatly affected. Dr. Stokes remarks that, in several cases, the patients were subject to neuralgic affections in other situations, as the face or extremities: in one severe case, dysmenorrhœa had long existed. I have seen this affection connected with excessive menstruation, and with other disorders of the uterine functions. I have referred it, in more than one case, to excessive bleeding and the use of mercury, and other exhausting or depressing causes.

62. The nature of the pains — their severity, the suddenness of their succession and disappearance, their intermissions, the good state of health in the intervals — all lead to the belief that they are the result of morbid sensibility, manifested in the nervous filaments or plexuses of the liver — of the nerves supplied by the great sympathetic or pneumogastric. Whether or no there may be, in some cases, latent causes of irritation of these nerves, as biliary concretions lodged in the ducts, or in the gall-bladder, although not productive either of biliary obstruction or of vascular disturbance, has not been fully ascertained. M. Andral

states that he has not found them in cases which he has inspected: but in one case, where hepatalgia had been complained of for many years, the gall-bladder contained a number of concretions; and in another, the patient had once experienced an attack which had been recognised as having arisen from the passage of gall-stones into the duodenum. The following is abridged from Dr. Stokes's treatise, as similar instances have occurred in my practice. A lady of luxurious habits and nervous temperament had been attacked, when in India, with pain in the region of the liver, which was imputed to acute hepatitis. She was largely bled and affected with mercury, without relief. On her passage to England, she was bled several times, and twice mercurialized. After her arrival she experienced returns of the violent pain, for which she was also bled, leeched, blistered, and mercurialized. These means had afforded temporary relief; but the complaint returned with increased severity, her constitution became shattered, hysterical paroxysms were frequent and violent, and the stomach irritable. Finding that fever was absent, the right hypochondrium supple, the lower part of the chest sounding clear, the tongue clean, the complexion clear, the above treatment was inhibited, and generous diet, change of air, and full doses of the carbonate of iron, were prescribed. In the course of a few weeks the lady had recovered. Another lady had been treated for hepatitis. A physician was consulted who could not detect any evidence of hepatic disease beside the pain. She was treated by the carbonate of iron with complete success.

63. A lady who had resided in India and experienced hepatic disease, for which she had been bled, mercurialized, &c., on her return to this country consulted an eminent accoucheur, on account of leucorrhœa and uterine disorder. She was hysterical and much weakened; and, in this state, she suffered a severe attack of hepatalgia, which was mistaken for hepatitis and treated accordingly, with marked aggravation of the pain. The disease was viewed as neuralgic upon my visiting her; and a treatment conformable to this view soon restored her to health. Instances, however, are continually occurring of disease — not merely of this kind, but also of various seats and forms — being aggravated, and the constitutional powers injured, by the empirical and routine practice of bleeding, mercurializing, over-dosing, and over-drugging: and although these practices are less remarkable now than twenty or thirty years ago, they are still notorious, and furnish arguments for the knaves of homœopathy, of hydropathy, and of other kinds of humbug, to assail the public mind.

64. *B.* Of the *Treatment* of hepatalgia it is unnecessary to add any thing to what is stated respecting the removal of *hysteric* and *neuralgic affections.* The same means as are recommended for these disorders are also applicable to this, with such modifications as the varying features and associations of particular cases may suggest.

65. Connected with *Functional Disorders* of the liver, the reader is referred to Bilious Diarrhœa and Cholera; to Concretions, Biliary; and Gall-bladder and Ducts.

66. II. Congestions of the Liver, Sanguineous and Biliary.

Classif. — I. Class. I. Order. (*Author.*)

67. Defin. — *Dyspeptic symptoms; costiveness or irregularity of the bowels, the stools being more or less unhealthy; loaded tongue; oppression at the scrobiculus cordis; a pale, sallow, or muddy state of the complexion, and often an increased bulk of the liver, as shown by percussion.*

68. Congestions of the liver are of frequent occurrence, but in various grades and associations. Congestion, as shown by Mr. Kiernan, may be confined chiefly to the hepatic veins, or it may exist in the portal vessels, or in both. These states of *Sanguineous congestion* may be associated, especially when considerable or prolonged, with *Biliary congestion.*

69. The slighter states of congestion, more particularly partial congestion, are often met with in dissections, particularly when the patient has died from disease attended by difficult circulation through the heart or lungs. These states often can hardly be considered as amounting to actual disease, but are rather consequences of the changes immediately preceding and attending dissolution; but they frequently assume more decided and serious forms; and, although the attendants, or merely the precursors, of several serious maladies, they often present themselves as primary and simple affections. They may be arranged as follows: — 1st, *Partial Sanguineous Congestion of the Liver:* — *a.* Hepatic Venous Congestion, — *b.* Portal Congestion: — 2d, *General Sanguineous Congestion of the Liver:* — 3d, *Biliary Congestion.*

70. *A.* The *First,* or *partial congestion,* may exist in either of the series of vessels concerned in the *double* circulation of the liver. But before I proceed to notice the two varieties of partial congestion, I may premise that the researches of Mr. Kiernan have shown that the differences which have arisen between Malpighi, Ruysch, Ferrein, Autenreith, Meckel, Mappes, and others, are owing to the circumstance of these anatomists having examined livers in different states of congestion in respect of the hepatic and portal veins; that the structure of the lobules* is similar, and

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* The *lobules* are small granular bodies, about the size of millet seeds. Each lobule is *composed* of a plexus of biliary ducts, of a venous plexus, formed by branches of the portal vein, of a branch (intralobular) of an hepatic vein, and of minute arteries; nerves and absorbents, it is presumed, also enter into their formation, but cannot be traced into them. Examined with the microscope, a lobule is apparently composed of numerous minute bodies, of a yellowish colour, and of various forms, connected with each other by vessels. These minute bodies are the *acini* of Malpighi. If an uninjected lobule be examined, and contrasted with an injected lobule, it will be found that the acini of Malpighi in the former are identical with the injected lobular biliary plexus in the latter, and the blood-vessels in both will be easily distinguished from the ducts. (Kiernan.)

Thus each lobule *receives* a branch of the portal vein, which ramifies into its margins and a minute artery, the portal vein and artery being *distributed to it;* and *gives origin* to an hepatic duct and an hepatic vein, which vein form a small trunk in its centre, and returns the blood, circulated into the lobule by the portal vein and artery, to the general venous circulation.

The following excellent summary of the anatomy of the liver is given by Mr. Erasmus Wilson in his admirable work on anatomy. "The liver has been shown to be composed of *lobules;* the lobules (excepting their bases) are invested and connected together, the vessels supported, and the whole organ enclosed, by Glisson's *capsule;* and they are so arranged that the base of every lobule in the liver is in contact with an hepatic vein (sublobular).

"The *portal vein* distributes its numberless branches through portal canals, which are channelled through every part of the organ; it brings the returning blood the same throughout; that one part of a lobule is actually not more vascular than another; and that there is, therefore, no distinction of red and yellow substances in the liver, the red colour resulting from congestion only, and according as the congestion is in the hepatic or portal veins, appearing in the central or marginal portions of the lobules.

71. As Mr. Erasmus Wilson has succinctly and clearly stated, each lobule is a perfect gland, of uniform structure, of uniform colour, &c. "It is the seat of a double venous circulation, the vessels of the one (*hepatic*) being situated in the centre of the lobule, and those of the other (*portal*) in the circumference. Now the colour of the lobule, as of the entire liver, depends chiefly upon the proportion of blood contained within these two sets of vessels; and so long as the circulation is natural, the colour will be uniform. But the instant that any cause is developed which shall interfere with the free circulation of either, there will be an immediate diversity in the colour of the lobule.

72. "Thus, if there be any impediment to the free circulation of the venous blood through the heart or lungs, the circulation in the hepatic veins will be retarded, and the sublobular and the intralobular veins will become congested, giving rise to a more or less extensive redness in the centre of each of the lobules, while the marginal or non-congested portion presents a distinct border of a yellowish white, yellow, or green colour, according to the quantity and quality of the bile it may contain. This is '*passive congestion*' of the liver, the usual and natural state of the organ after death; and, as it commences with the hepatic vein, it may be called the first stage of *hepatic-venous* congestion.

73. "But if the causes which produced this state of congestion continue, or be from the beginning of a more active kind, the congestion will extend through the lobular venus plexuses 'into those branches of the portal vein situated in the *interlobular fissures*, but not to those in the *spaces*, which, being larger, and giving origin to those in the fissures, are the last to be congested.' In this second stage the liver has a mottled appearance, the noncongested substance is arranged in isolated, circular, and ramose patches, in the centres of which the spaces and parts of the fissures are seen. This is an extended degree of *hepatic-venous congestion*; it is '*active congestion*' of the liver, and very commonly attends diseases of the heart and lungs.

74. "There is another form of partial venous congestion which commences in the portal vein; this is, therefore, *portal-venous congestion*. It is of very rare occurrence, and Mr. Kiernan has observed it in children only. In this form the congested substance never assumes the deep red colour which characterises hepatic-venous congestion; the interlobular fissures and spaces, and the marginal portions of the lobules are of a deeper colour than usual; the congested substance is continuous and cortical, the non-congested substance being medullary, and occupying the centres of the lobules. The second stage of hepatic-venous congestion, in which the congested substance appears, but is not cortical, may be easily confounded with portal-venous congestion.

75. "These are instances of *partial congestion*, but there is sometimes *general congestion* of the organ. 'In general congestion the whole liver is of a red colour, but the central portions of the lobules are usually of a deeper hue than the marginal portions.'"

76. The second stage of hepatic venous congestion, when combined with biliary congestion, gives rise to those varied appearances which are called dram-drinker's or nutmeg liver.

77. When the circulation of the liver is impeded in consequence of depressed organic nervous or vital power, or of any other cause, or when the circulation through the capillaries of the lungs is interrupted, or when the general circulation is embarrassed by disease of the orifices or valves of the heart, congestion takes place in the liver. A slight degree of obstacle in the lungs or heart causes congestion of the hepatic veins only, the venous turgescence being limited by the lobular venous plexus. A greater degree of obstruction produces congestion of the lobular venous plexus itself; and if the obstacle continue, or is increased, the congestion extends through the interlobular fissures into the neighbouring lobules, and, in a more advanced degree, it spreads itself throughout the whole of the lobules and becomes general. From the liver the congestion extends to the alimentary canal, occasioning hæmorrhoids, intestinal hæmorrhages, ascites, &c. When sanguinous congestion becomes general, as respects both the portal and the hepatic veins, and especially when it is associated with biliary congestion, the colour of the organ is much deeper, and varies with the colour of the bile in the ducts. The liver at the same time, particularly in hot climates, is more or less swollen, so as to extend, in some cases below the margins of the ribs, but more frequently to rise higher than usual in the right thorax.

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from the chylopoietic viscera; it collects also the venous blood from the ultimate ramifications of the hepatic artery in the liver itself. It gives off branches in the canals, which are called *vaginal*, and form a venous *vaginal plexus*; these give off *interlobular branches*, and the latter enter the lobules and form *lobular venous plexuses*, from the blood circulating in which the bile is secreted.

"The *bile* in the lobule is received by a network of minute ducts, the *lobular biliary plexus*; it is conveyed from the lobule into the *interlobular ducts*; it is thence poured into the biliary *vaginal plexus* of the portal canals, and thence into the excreting ducts, by which it is carried to the duodenum and gall-bladder, after being mingled in its course with the mucous secretion from the numberless muciparous follicles in the walls of the ducts.

"The *hepatic artery* distributes branches through every portal canal; gives off *vaginal branches*, which form a vaginal hepatic plexus, from which the *interlobular branches* arise, and these latter terminate ultimately in the lobular venous plexuses of the portal vein. The artery ramifies abundantly in the coats of the hepatic ducts, enabling them to provide their mucous secretion; and supplies the vasa vasorum of the portal and hepatic veins, and the nutrient vessels of the entire organ.

"The *hepatic veins* commence in the centre of each lobule by minute radicles, which collect the impure blood from the lobular venous plexus, and convey it into the *intralobular veins*; these open into the *sublobular veins*, and the sublobular veins unite to form the large hepatic trunks by which the blood is conveyed into the vena cava.

"The physiological deduction arising out of this anatomical arrangement is, that the *bile is wholly secreted from venous blood*, and not from a mixed venous and arterial blood, as is believed by Müller; for, although the portal vein receives its blood from two sources, viz. from the chylopoietic viscera and from the capillaries of the hepatic artery, yet the very fact of the blood of the latter vessel having passed through its capillaries into the portal vein, or in extremely small quantity into the capillary network of the lobular venous plexus, is sufficient to establish its venous character."

78. *B. Biliary congestion* is often present, but in various degrees. In the slighter grades it may be the chief lesion, and, in these, it is merely one of function, depending principally upon deficient vital energy of the organ, or upon temporary impediments in the way of the passage of bile along the common or hepatic duct. In its more chronic, general, or severe states, it may be consequent upon hepatic venous congestion, which causes pressure upon the lobular biliary plexus, and interlobular ducts. It may also proceed from temporary or prolonged turgescence or thickening of the mucous lining of the ducts, or from capillary congestion or inflammatory action, diminishing the calibre of the ducts. This obstruction, as Mr. E. WILSON remarks, may subside after a shorter or longer period; or it may become chronic, and be a permanent impediment to the current of bile. Congestion, however, of the bile ducts is probably more frequently caused, when slight or temporary, by causes affecting the states of organic, nervous, or vital influence of the organ, and, when more chronic and severe, by morbid states of the bile itself, rendering it disposed to become viscid and thick, and thus to flow with greater difficulty along the ducts ("Difficili bile tumet jecur." HOR.), and by mechanical obstacles in the large ducts. Of these latter, the most common are the impaction of biliary concretions in the ductus communis, or hepatic duct, inflammation of these ducts, enlargement of the absorbent glands in their vicinity, and the pressure of these or of other tumours, disease of the pancreas, turgescence of the mucous coat of the duodenum, and other changes fully described in the articles GALL-BLADDER and DUCTS, and JAUNDICE.

79. In proportion, generally, as the obstacle is complete, so are the ducts loaded with bile, which imparts a deep yellowish, or yellowish green, or deep green or greenish brown, tint to the organ; much, however, both of the tumefaction and depth of colour depends upon the degree of hepatic, venous, or portal congestion attending the biliary congestion, the hepatic veins being generally loaded in chronic cases of biliary accumulation. When one of the bile-ducts is obstructed by a biliary concretion, the branches above the obstruction become dilated and filled with bile which is thick and viscid, when the obstacle has been of some continuance; but this subject is more fully discussed in the articles just named, and in that on CONCRETIONS, BILIARY.

80. *C. Causes.*—Whatever directly or indirectly depresses the vital energy of the liver, necessarily impairs the tonicity of the veins and favours congestion of them. That the portal veins are more frequently the seat of congestion than is usually supposed, may be inferred from their removal beyond the direct current of the circulation, and from their forming a circulating system of themselves, depending entirely upon their own vitality and that of the liver for the due performance of their circulating function. The circumstance of the portal vessels being found less loaded than the hepatic veins after death, is no proof of the absence of congestion of them during life; for being endowed with certain of the properties of arteries, they also possess in some degree that of contracting or of emptying themselves partially at the moment of dissolution.

81. The ingestion of much food and fluid further promotes congestion of the portal system, inasmuch as a part of these materials find their way directly into the veins which pour their contents into the portal vein; and, although such supply of new materials may not materially affect the robust person who promotes the circulating and secreting functions of the liver by regular and sufficient exercise, yet, when inordinate, it must load the portal and the hepatic veins of the weak, the dyspeptic, the predisposed to disorder of the biliary organs, particularly if they be indolent and doomed to sedentary occupations, and favour a morbid secretion of bile, and accumulations of it in the ducts and gall-bladder. Of the causes of the congestive conditions of the liver, the most influential are high ranges of temperature followed by sudden changes, and exposure to cold or to moisture and malaria; too much animal food; intemperance; want of exercise, particularly in the open air; periodic fevers, and the other causes above adduced (§§ 19. *et seq.*)

82. It ought not to be forgotten that an accurate examination will detect congestions of the liver — *sanguineous* or *biliary*, or both — at the commencement of many diseases, especially of periodic and continued fevers, and of inflammations of the organ. They not infrequently originate, when neglected or improperly treated, other maladies, particularly inflammations, bilious fevers, dysentery, cholera, hæmorrhoids, &c.; and they often attend or follow periodic fevers and diseases of the brain, of the lungs, and of the heart, of the aorta, &c.

83. In *warm climates*, especially in the *East Indies*, congestions of the liver frequently assume very active states, and more prominent features than in temperate climates; and, owing to the general association of biliary with sanguineous congestion, and the great amount of both, it is much more difficult to determine the exact share which each portion of the circulation of the organ bears in the production of the morbid appearances. Generally, however, the viscus is much increased in size, particularly the right lobe, and the increase in bulk often takes place chiefly in the direction of the thoracic cavity, the right lobe rising up into the chest. The difference of colour observed in different cases, and even in the same, seems to depend upon the particular set of vessels chiefly affected, and upon the absence or coexistence of biliary congestion, and the colour of bile in the ducts. The surface of the congested liver is of a dark brown, greenish-black, occasionally passing abruptly into a reddish or light brown tinge. Sometimes it is mottled, or streaked, or clouded with tints of various deepness. The shades of colour are usually most remarkable upon the convex surface, and most frequently observed there. In some cases the surface of the liver is very dark, yet upon dividing its substance, the internal texture is of the usual colour, but more commonly it is darker, and much black fluid blood escapes. The bile found in cases of biliary congestion varies in its characters, but it is commonly darker and thicker than natural, and as described in the article GALL-BLADDER and DUCTS.

84. Passive or mechanical congestion of the liver is not infrequently met with in *infants*, owing to asphyxia upon coming into the air at birth. Those who die in this state present the liver enormously congested.

85. *D.* The *symptoms* of sanguineous and biliary congestions of the liver cannot be individually depended upon. They should be viewed in connection, and duly estimated. We may, however, infer the existence of these disorders when several of the following phenomena present themselves. A pale, sallow, anxious, or muddy hue of the countenance; a white, loaded, or furred tongue; costiveness or irregularity of the bowels, the stools being watery, dark, or otherwise morbid, and preceded by griping, difficult or slow digestion, with flatulence or nausea, and various dyspeptic symptoms; uneasiness, weight, or oppression, particularly after a meal, at the pit of the stomach and region of the liver; oppressed or heaving respiration; the sudden occurrence of pain, fullness or weight at the epigastrium, right hypochondrium, or across the shoulder blades, or below the right scapula, the uneasiness being increased by full inspiration and pressure; a full, slow, oppressed, or irregular pulse; a cool, clammy, dingy state of the skin, a turbid state of the urine; and headache, restlessness, disturbed sleep and unpleasant dreams. Upon examination of the region of the liver by percussion, the sphere of dulness will be found extended, particularly towards the right thoracic cavity. Many of these symptoms, indeed most of them, are observed in inflammations of the organ, but they are then attended by increased frequency and hardness of pulse; by heat of skin and feverishness, particularly at night; by thirst, sometimes with retchings, and by aggravation of the symptoms enumerated. Hence it is as much by the absence of the symptoms characterising the more serious diseases of the liver, as by the absolute value of those mentioned, that we infer the existence of congestions of the organ.

86. The pulse in congestions is variable and cannot often be depended upon. Although a dull or aching pain, weight, or oppression about the epigastrium, or under the scapulæ, characterise in general inflammation of the substance of the liver; yet these are often signs of congestion also — especially when they occur suddenly, and are attended by many of the symptoms already described. Inflammation does not arise or reach its acmé in a few hours, but congestion may. Neither can pain be always considered indicative of inflammation, since the membranes of the liver are often stretched by congestion so as to occasion pain. When *biliary* congestion is at the same time considerable, uneasiness at the epigastrium, a sallow, dingy, or even jaundiced state of the countenance and skin, slowness of pulse, lowness of spirits, inactivity, &c. become prominent symptoms. If an increased secretion of bile follow this state, the congested state of the vessels is relieved, and the circulation rendered more free and natural. But if the congestion continue, inflammation and other consequences already noticed, very often ensue.

87. *E. Treatment.*—When the symptoms of *active sanguineous congestion* of the liver are well marked, and when the patient is strong, young, or plethoric, or is recently arrived in a hot climate, general or local *bloodletting*, according to the peculiarities of the case, is required. The state of the pulse in this affection should not preclude having recourse to this practice, if other circumstances show the propriety of it. In some instances, where a repetition of the bleeding may be necessary, in order to prevent the appearance of inflammatory reaction, which is apt to follow the congestion, particularly in warm climates, when bleeding has been neglected or insufficient, subsequently a full dose of a mercurial medicine, followed by deobstruent and saline aperients, and by enemata if requisite, and a blister applied over the epigastrium and right hypochondrium, will generally remove all disorder. When, however, much *biliary congestion* or accumulation is associated with vascular congestion, a frequent recourse to chologogue purgatives is required. In many of these cases an emetic may be given with advantage, after vascular depletion has been practised where it has been indicated. In the more severe cases, however, of *vascular* congestion, emetics are hazardous unless copious depletion has been resorted to, and the state of the biliary function indicate the propriety of prescribing them. However slight vascular congestion may seem, it should be recollected, particularly by the East Indian practitioner, that it often originates the most dangerous forms of hepatitis, and that abscess may quickly follow inflammation consequent upon the congested state.

88. In the *passive states* of vascular congestion of the liver consequent upon interrupted capillary circulation in the lungs, or upon impeded circulation through the heart or aorta, or associated with adynamic periodic fevers, scurvy, &c., the *treatment* must entirely depend upon the nature and state of the primary affection, and upon its pathological relations. In several of these, particularly when the lungs are congested or inflamed, vascular depletions are necessary; but, in asthmatic, chronic bronchitic, and similar affections, the hepatic congestion thereby caused requires chologogue purgatives, occasionally emetics, and deobstruents. If the hepatic vascular congestion be produced by affections of the heart, bloodletting may be injurious, it ought to be cautiously employed, if employed at all; the chief attention being paid to the regulation and correction of the secretions and excretions, and to the support of the vital powers.

89. III. Hæmorrhage of the Liver.—Hæmorrhage into, or from, the liver is very rarely observed. When the blood is effused into some part of the substance of the organ, producing what the French pathologists have termed apoplexy of the liver, the extravasation has been consequent either upon passive congestion of the organ, owing to impeded circulation through the heart, aorta, or lungs, or upon deficient tone of the capillaries of the organ, or softening of the part, the seat of hæmorrhage. In an interesting case, recorded by Sir G. Blane (*Trans. of Soc. for Imp. Med. Knowledge*, vol. ii. p. 18.), the hæmorrhage seemed to have been consecutive of the latter changes, as it was associated with purpura. It had formed cavities in the substance of the organ; these had burst, owing to return of the extravasation, and effused their contents into the abdominal cavity. M. Andral supposes that hæmorrhage may take place in the structure of the organ in consequence of acute inflammation, but this is not very probable. The extravasation is rarely owing to the rupture of a considerable vessel, but rather to exudation from a number of capillaries, giving rise to several minute collections of fluid or coagulated blood. M. Andral supposes, from specimens furnished him by MM. Rullier and Reynaud,

that the fibrine of these collections, when deprived of the red particles, gives origin to certain new productions, encephaloid and others, that are found in the liver; but this requires further proof.

90. Several writers have supposed that hæmorrhage may take place from the liver along the hepatic ducts, the blood passing into the radicles of these ducts, or into their branches or trunks, owing to laceration of the part where the extravasation occurs; but no satisfactory proof of either occurrence has been adduced. The blood, however, may possibly pass into commencement of the hepatic ducts in cases of extreme congestion. This subject deserves, but does not readily admit of, further elucidation.

91. Hæmorrhage from the liver is most frequently *caused* by external injury, and *rupture*, of the organ. When the liver is congested, and at the same time softened—changes occasionally produced in humid and miasmatous situations, either primarily or in connection with adynamic remittent or intermittent fevers—comparatively slight external injuries have ruptured the organ and caused fatal hæmorrhage into the abdomen.

92. Ulceration of one of the hollow viscera may occur, and the inflammation thereby induced in the peritoneal covering may be followed by adhesion to the liver; the ulcer ultimately penetrating into the substance of this organ, eroding one or more of the vessels, and thus producing fatal hæmorrhage into the alimentary canal. I have seen altogether three instances of this kind of hæmorrhage: two where the ulceration commenced in the stomach, extending through the peritoneum, which was firmly adherent to the liver, and terminating in the parenchyma of the latter; and one where it originated in the right flexure of the colon, and proceeded in a similar manner. (See Stomach, *ulceration of*).

93. In all these cases, the source of hæmorrhage can be determined only by examination after death. Granting the possibility of the passage of the blood from the portal veins into the biliary ducts, and thence from the bowels, the *symptoms* are not such as will indicate it during life, for we have no means of determining whether the blood voided from the bowels proceeeds from the liver or from the small intestines.

III. INFLAMMATION OF THE LIVER. — SYNON. Ἡπατιτις, (from ἧπαρ, the liver) *hepatitis*; *νουσος ἧπατκιη*, Galen. *πυρετος ικτεριωδης*, Græc. *Morbus jecinoris*, *jecoris vomica*, Celsus. *Inflammatio hepatis*, Sennertus. *Hepatitis*, Auct. Mult. *Hepatalgia Apostematosa*, Sauvages. *Cauma Hepatitis*, Young. *Empresma hepatitis*, Good. *Hépatite*, *Inflammation du foie*, Fr. *Entzündung der leber*, *leberentzündung*, *leberkrankheit*, Germ. *Inflammazion di fegato*, *epatite*, Ital. *Inflammation of the Liver*, *hepatic Inflammation.*

Classif.—1. *Class*, 2. *Order*, (*Cullen*). 3. *Class*, 2. *Order*, (*Good*). III. Class, I. Order (*Author*, in *Preface*.)

94. Defin.—*Pain, aching, tenderness or fulness, in the right hypochondrium or epigastrium, the pain often extending to the right shoulder blade, and other parts; inflammatory fever; furred tongue; frequently cough or bilious vomiting; costive or irregular bowels; scanty, high-coloured urine; a slightly yellow tinge of the face, and sometimes complete jaundice.*

95. Inflammation of the liver frequently originates, silently and insidiously, in some one of the functional disorders already noticed. In warm climates, particularly, it is sometimes preceded by *increased secretion of bile*, marking excitement of the organ, with febrile symptoms, diarrhœa, or slight dysentery, which often attract the chief notice and mislead the physician. In some cases, the *biliary congestion* becomes a cause of irritation to the circulation of the organ, and kindles the inflammatory action it is already prone to undergo; and this is the more to be dreaded, if *vascular congestion* is also present; such congestion being commonly the antecedent of inflammation in some one or other of its forms. It is comparatively rare that hepatitis occurs in a previously sound state of the functions of the organ, unless the exciting causes are energetic, and in warm climates, especially among the new residents. When inflammation thus originates in any of the functional disorders of the liver, it is most difficult to date its commencement; for a slight or early grade of inflammatory action, affecting a part only, as it usually does, of the substance of the organ, may give rise to the symptoms of any one of these disorders, those indicating inflammation being so slight as to escape attention.

96. Inflammation may be *limited* to the following parts of the organ, namely, the superior or convex surface, the inferior or concave surface, the internal or parenchymatous structure, and the right or left lobe. The right lobe is most frequently the seat of inflammation; next the right and left together; and the left lobe only the last in frequency. The inflammatory appearances in the superior surface of the liver are often limited by the broad ligament. When the surface is the seat of the morbid vascular action, the adjoining internal structure of the organ generally participates in it to a greater or less extent; and likewise when it commences in the parenchymatous structure, it sometimes extends to the external surface; but this more rarely occurs, especially in warm climates, than the former mode of extension; the internal structure being the seat of inflammation more frequently than the surfaces, which seldom participate in it, until an advanced stage of the disease. Sometimes, however, inflammation of the surface of the liver may arise from inflammation and the exudation of lymph from an adjoining viscus, as from the stomach or duodenum; and, in these cases, the surface is the chief seat of disease, which may be either limited to it, or extended partially to the substance of the organ. When inflammation originates in the surfaces, or extends to them consecutively, coagulable lymph is generally thrown out on them, and the peritoneal covering is then or has been inflamed; but the parts immediately subjacent may present every mark of inflammatory action, and yet the investing membrane may not participate in it, to the extent at least of throwing out coagulable lymph. In warm climates, particularly in the East Indies, the substance of the liver is often the seat of acute inflammation, or of large abscesses, without any decided mark of inflammation of the envelope of the organ, besides alterations of colour merely, in some cases, which alterations are often independent of the inflammation, or connected with the state of the biliary congestion. Abscesses may even proceed to their utmost extent, and ultimately

break into the abdominal cavity, without having induced inflammation of the serous membrane where they point, without having produced coagulable lymph on its surface, and consequently, without having formed adhesions to adjoining parts.

97. The relations, connections, and integral structure of the organ being so various; the seat of inflammation being often limited to a particular part or tissue; and the character and intensity of the disease also varying greatly; it may be expected that the symptoms will also differ, accordingly, in different cases; that they will be often obscure or equivocal; and that they will be still more so, when hepatitis is *complicated*, as it often is with *gastritis*, or with *duodenitis*, or with *dysentery* or *chronic diarrhœa*.

98. Owing to the varying seat and intensity of hepatitis, the different *forms* of it have been arranged accordingly — into inflammation of the *surface* and of the *substance* — into *acute* and *chronic*. These, and other arrangements, are merely, however, conventional; and although the terms acute and chronic indicate chiefly extreme grades of the disease, the division they mark is, upon the whole, the most practical, keeping in recollection that every intermediate grade of action or intensity may be presented by this disease. Many writers have considered that acute hepatitis commences or is seated in the surface of the organ, whilst the chronic form affects the parenchymatous structure. But although inflammatory action, commencing in the surface of the viscus, almost always assumes an acute form, yet, when seated in the substance of it, the chronic form is not the only one assumed, or if assumed at first, it is not generally preserved. In warm, and even in temperate climates, the most acute inflammation of the liver, as respects many of its symptoms as well as its duration, affects both the substance of the organ and some part of its surface, or the former only. It has likewise been supposed that, as suppuration takes place in the substance of the organ, it is most commonly a consequence of chronic inflammatory disease. But this is not the case, especially in India, and some other warm climates, for abscess often follows with great rapidity the most acute form of the disease, as regards the quickness of its progress.

99. *Investigation* of the diseases of the liver, more especially of those which are inflammatory, should be made patiently and attentively; and an *ocular* as well as a *manual examination of the region of the liver ought always to be made.* Even in cases where the nature of the disease is obvious, this ought not to be neglected. Although such investigation may give us but little information in the functional disorders, or in the early stages of inflammatory diseases of the organ, yet it should be resorted to. Information, even of a negative kind, is always requisite in hepatic affections, and particularly in those which are acute. The trunk of the body should be exposed to view, so as ascertain the existence of bulging or fulness in any part of the hypochondrium or its vicinity. When making manual examination, one hand should be pressed gently on the part between the base of the right shoulder-blade and the spine, whilst, with the other, the physician endeavours to detect tenderness, fulness, or distension, either beneath the false ribs, or at the epigastric region, or to the left of this region, or between the right hypochondrium and umbilicus. The state of the intercostal spaces should also be examined on the right side; and if pain be complained of in any of these situations, its nature ought to be ascertained by careful and varied pressure, whilst counter-pressure is made on the back, in the place just named, and during full inspiration and forced expiration. When the examination is going on, the patient should be directed to bend or move his body in various directions, and to stand, stooping forwards, leaning with his hands on the top of the back of a chair. If fulness, swelling, or distinct tumour be felt, the physician should endeavour to ascertain its nature and connections, by gentle and varied pressure with the points of the fingers; and the existence of tenderness, and the degree of tenderness, the depth at which it seems to be seated, and the presence of fluctuation, whether obscure or palpable, ought to be inquired into with as much dexterity as possible. A rough, rude, or forcible, examination ought to avoided, as causing contraction of the muscles, and as being productive of pain and even of serious injury, in abscess of the organ, or in states of inflammatory congestion of the parenchyma, when more or less softening also often exists.

100. i. *Acute and sub-acute inflammation* may affect either the *parenchymatous structure* or *the surface of the organ;* but it may also implicate both, although either one or the other in a greater degree or extent. — *A.* When *the substance of the organ* is solely or chiefly inflamed, the disease may commence either with chills or rigor, or with diarrhœa, or without either, particularly after exposure to cold, wet, currents of air, the night dew, or to malaria. When chills usher in the attack, then many of the symptoms indicating vascular congestion of the viscus (§ 85.) are usually present, and generally attend the inflammation during its course. The patient complains of oppression, weight, or uneasiness in the right hypochondrium and at the pit of the stomach, extending sometimes to the ensiform cartilage, and in the direction of the diaphragm to the back and shoulder-blades. These are usually increased on a full inspiration, when pressure is made beneath the ribs, or upon the stomach and back at the same time. The pulse is hardly affected at this early period of the disease; but it soon becomes quicker at night. It is sometimes slow and oppressed, and occasionally irregular, or even intermittent. The countenance is now pale, sallow, or somewhat anxious; the spirits much depressed; the tongue white or yellowish, or more or less foul, with an unpleasant taste of the mouth, sickness, and loss of appetite. The bowels are at first often costive or irregular, or diarrhœa may exist, and the urine is scanty and high-coloured. Oppression at the chest and epigastrium; slight dyspnœa, and sighing; headach, and disturbed sleep, with night-fever and restlessness, are also generally present.

101. *a.* As the disease advances, the pulse becomes quicker, fuller, and more irritable, during the evening and night, and is often oppressed or embrraassed during the morning and day. The uneasiness in the region of the liver and epigastrium is augmented; and if vascular fulness of the organ be great, and if the disease has followed congestion, the patient complains of a heavy dragging pain, increased by sudden motion, or

by turning quickly in bed. There is sometimes a short, suppressed cough, dyspnœa, shortness of breathing, a catch in full inspiration, particularly after sudden motion. On examination, tumidity of the viscus is evinced by the protrusion, or dulness on percussion beneath the ribs and scrobiculus cordis, and by the dulness of sound extending higher than usual in the right thorax. A dull pain or aching is often felt in the region of the liver, in the lower part of the thorax, and in the epigastrium, occasionally extending from the right side under the shoulder-blade to the spine. It is sometimes referred to the top of the right shoulder, frequently to the right shoulder-blade, occasionally to both scapulæ, or only to the loins. In a few instances, it is felt in the right clavicle and side of the neck; and, in others, it extends downwards to the right thigh. It more rarely affects the left shoulder and shoulder-blade only. When pain is present in the top of the right shoulder, it indicates disease of the right lobe of the liver; but this symptom is often absent. In some cases it is increased, or excited when not previously felt, upon any sudden concussion of the trunk, or upon quick motion, or making a false step, or turning suddenly from one side to the other. But, in many cases, there is little or no pain: or it is complained of on these latter occasions; or there is merely a sense of aching or dragging, with oppression at the præcordia, anxiety, and frequent sighing. Pain is seldom acute, tensive, or pungent, unless the surfaces or ligaments become affected. It occasionally extends from under the ensiform cartilage, in the direction of the mediastinum, to the back or shoulder-blades, and it is then attended by dyspnœa, oppression or a sudden catch in breathing, and a dry cough.

102. The *position* of the patient varies with the severity and seat of pain. Frequently he is easiest in a semi-recumbent posture. Difficulty of lying on the right side is not often felt, unless the pain in it is acute. In many cases, any position may be preserved for a time without pain, although uneasiness and a change of posture may follow. Occasionally the patient prefers to sit gently bent forward.

103. In proportion to the attendant congestion or tumefaction of the organ, the right cavity of the chest is encroached upon by it, as shown by the extended sphere of dulness on percussion. In this case, there is also greater fulness observed in the right hypochondrium and epigastrium; the margins of the ribs being pushed slightly outwards. Oppressed breathing, frequent dry cough, occasionally acute pain owing to stretching of the envelopes of the organ, and increased discharge of bronchial mucus, are complained of; and these symptoms, with exacerbation of pain in the chest on full inspiration, or on coughing, the flushed or full appearance of the countenance occasioned by the impeded circulation through the lungs, may lead the inexperienced to mistake the disease for pneumonia; but, in these cases, there are pain or uneasiness about the scapulæ, or top of the right shoulder; occasionally numbness of the right arm, with pain about the insertion of the deltoid muscle, or at the wrist; and more rarely, numbness or pain extending to the right hip or thigh; symptoms indicative of the seat of the malady.

104. Nausea and vomiting are often concomitants of the most acute attacks; but, when urgent or continued, there is reason to believe that the concave part of the liver is affected, or that the inflammation extends thence to the stomach, or that it proceeds in the course of the hepatic ducts to the gall-bladder and duodenum. In these cases, the patient complains of a sense of fluttering, weight, or fulness in the right hypochondriac and epigastric regions; sometimes of pain in the abdomen, and reclines chiefly on the left side or back. The stools are generally watery, frequent, scanty and dark coloured, with tenesmus, occasional discharges of blood, and other symptoms of dysentery, for which it is often mistaken. Even when little sickness at stomach is present, there are loss of appetite, and heartburn, or gripes, about an hour or two after a meal, with thirst and lowness of spirits.

105. *b.* As inflammation of the substance of the liver advances, the febrile symptoms, particularly the evening exacerbations, become more marked, and the pulse more irritable. The tongue is covered by a white or yellowish brown fur — moist in the early, but dry in the advanced, stages. Where the disease has followed disorder of the alimentary canal, or repeated attacks of hepatic disorder, the tongue is often smooth and glossy, marked by fissures, and lobulated, particularly in the most severe cases, and in those about to terminate in, or which have already terminated in, abcess. In other cases, especially when congestion, sanguineous or biliary, has passed into inflammation, the papillæ of the tongue are large and distinct, and the surface of it foul and coated.

106. The countenance and skin at the invasion of the disease, or when chills or rigors are present, are pale or sallow. But as the inflammation is developed, the countenance fills out more fully, particularly when there are fulness and oppression in the region of the liver and chest; and a dusky redness appears in the cheeks. The face and eyes, however, still possess a muddy or sallow hue and a dark circle surrounds the eye, particularly beneath it. The patient often complains of pain in the forehead or over the eyes. The skin on the trunk is warmer than natural, especially towards evening, sometimes with a greasy feel, and a scanty or partial perspiration. When the perspiration is more copious it is often offensive. Jaundice frequently occurs in the hepatitis of Europeans, particularly when passing on to abscess, but it seldom takes place in warm climates unless the gall-bladder or ducts are involved, or when hepatitis follows biliary calculi or obstruction of the ducts. The eyes and countenance are always deficient in clearness, and present a slight yellowish or sickly hue.

107. Deficiency of bile in the stools is often observed in connection with hepatitis, but in warm climates it does not often occur; although it is remarked more frequently than a too abundant secretion. When hepatitis is connected with congestion or with accumulations of acrid or morbid bile in the hepatic ducts and gall-bladder, the stools are disordered from the commencement: they are foul, dark-coloured, fœtid, watery, and frequent; or dark green, and offensive; or at first feculent and brown, and afterwards morbid and dysenteric. There is generally tenesmus, owing to the irritation of the morbid secretions, on the mucous surface of the rectum, and this,

with other dysenteric symptoms, often masks the hepatic disease.

108. The urine is scanty, high-coloured, deposits a latertitious or pinky sediment, and scalds the patient in passing it. If the bile be obstructed, a brown, or dark, flaky sediment is often deposited.

109. *c.* The *progress* of inflammation of the substance of the liver is commonly such as now described, both in temperate and in warm climates, until it is resolved by treatment, or has passed into suppuration. But it may present certain *modifications.* It may commence as bilious inflammatory fever, with a full, strong, and frequent pulse, great heat of skin, vomiting, thirst, and various symptoms referrible to the liver and bowels, and indicating predominant affection of them. This form is common in robust, plethoric persons, and particularly those who have recently arrived in a warm climate.

110. In some cases, inflammation affects the substance of the liver and proceeds to suppuration in a more obscure and insidious a manner than that above described. The patient may have complained merely of dyspeptic symptoms, and irregularity or looseness of the bowels, when shivering, followed by heat of skin, and profuse clammy perspirations, ushering in true hectic fever, indicates the supervention of suppuration. In most of these, the case is neglected, or its nature overlooked, until the inflammation either extends to the coverings of the liver, or has given rise to abscess; the symptoms, produced by the one or the other, being those which first attract attention, and disclose the true state of the disease.

111. *d.* The *duration* of acute and sub-acute inflammation of the substance of the liver varies from three or four days to as many months, with the severity of the attack, the intensity of the exciting causes, the habit and temperament of the patient, and the treatment employed; and, as these circumstances may combine, so will the disease be disposed to *terminate in resolution, in abscess, or in some other organic change.*

112. *B. Inflammation of the Surface of the Liver* assumes a more acute and definite character than that of the parenchyma. — *a.* Inflammation of this part, *acute sero-hepatitis,* may occur *primarily* or *consecutively;* in the latter case, the morbid action extends to the surface from an adjoining part of the substance of the organ, or from the peritoneal covering of an adjoining viscus. In this state of the disease, the febrile reaction is prominent, and generally consequent upon chills or rigors. The pulse is much accelerated and hard; pain in the right hypochondrium is more or less acute;. and when the upper surface of the right lobe is affected, or when the lobe is much tumified, so that it rises into the chest, considerable tension and pain are felt also in the right thorax, and under the ensiform cartilage and sternum, resembling an attack of pleuritis. Cough, increased pain, or a catch on full inspiration, and tenderness on pressure, especially at the time of a full inspiration, are also present. When the whole of the upper surface of the organ is inflamed, the disease may be mistaken for pneumonia, if the chest be not accurately examined by the stethoscope and percussion; oppression, difficulty of breathing, pain in the course of the diaphragm and under the sternum, being generally considerable. Heat and dryness of the skin, thirst, and the other constitutional symptoms, are more fully developed than in the former variety of hepatitis, and are such as usually accompany acute inflammations of serous membranes.

113. The stools are generally disordered and variable. They are at first scanty, infrequent, and costive; more rarely loose. They are often deficient in bile; but, in warm climates, this is comparatively rare, unless sero-hepatitis has followed torpor or congestion of the organ; more frequently the bile seems unhealthy, and occasionally redundant. At an advanced stage, the bowels are often more relaxed, and the bile is increased. Sometimes diarrhœa, tenesmus, or even dysentery, supervenes in warm climates during the advanced periods of the disease, apparently owing to an increased discharge of morbid bile. The urine is generally high-coloured.

114. *b.* When the *superior surface* of the liver is affected, and there are much tumefaction and congestion of the organ, the symptoms are partly referred to the chest. Coagulable lymph is often thrown out upon this surface, and inflammation is thereby induced in the peritoneal surface of the diaphragm. Hence, symptoms of diaphragmitis often supervene, associated with those of the liver, and with considerable congestion of the lungs. In these cases, the distress and febrile symptoms are very prominent. The patient breathes chiefly by the intercostal muscles, and expresses anxiety at the epigastrium and præcordia, with a sense of tension or stricture across the chest, and an inability to sit or lie otherwise than bent forward. Cough is frequent, hard, and suppressed, with great increase of the pain, inability to take a full inspiration, and occasionally slight mucous expectoration. There are, also, often fulness at the false ribs and epigastrium, shortness of breath, inability of motion or exertion, headach; a full, dusky, and anxious state of countenance.

115. When the outer surface and part of the right lobe is chiefly affected, the pain is most severe in the right hypochondrium, and at the margins of the ribs, sometimes extending to the right scapula and top of the shoulder. A fulness is often perceptible under the margins of the ribs, with tenderness on pressure. The temperature in the region of the liver is sometimes higher than in any other part. The patient most frequently lies on his back, or in a semi-recumbent posture.

116. *c.* When the *concave surface* of the liver is the seat of the disease, and the posterior part or margin is affected, or when the inflammation extends to these situations, the functions of the stomach are then prominently deranged. Nausea and vomiting are often present soon after substances are taken into the stomach. Thirst, anxiety, and pain in the epigastrium, or in the back, are urgent; and sometimes the pain extends to the right shoulder and right side of the neck. The pulse is variable, but generally irritable, quick, small, contracted, or hard. There are often a sense of fluttering at the scrobiculus cordis, a heavy dragging pain in the same situation, anxiety, frequent sighing, and occasionally, at an advanced stage, hiccup, particularly after

cold fluids are taken into the stomach. The patient generally lies on the right side, or on his back.

117. *d.* When the inflammation extends to the gall-bladder or ducts, or to the stomach or duodenum, all the symptoms become more severe. The vomiting is frequent and distressing when the disease implicates the *stomach* or *duodenum;* and burning heat and fulness are felt at the epigastrium, with frequent and painful eructations of flatus, and great tenderness at the epigastrium and right hypochondrium; sunk, anxious countenance, increased heat of the trunk, cold, clammy hands, and quick pulse. If the *ducts* and *gall-bladder* be affected, the pain darts to the right side and back, from the epigastrium; it is also often felt in or near the angle formed by the spine and base of the right scapula. Sometimes it extends from under the ensiform cartilage to the umbilicus, and back to the right hypochondrium. Singultus and acrid eructations are not infrequent in the advanced course of the disease. The patient can seldom bear pressure on the right side and epigastrium, the uneasiness being increased on a full inspiration. In most of the cases of sero-hepatitis, uneasiness or pain is aggravated not only on a full *inspiration*, but also on a forced *expiration;* for this latter mode of ascertaining the seat of pain ought never to be neglected in our investigations of diseases of the liver. Restlessness, want of sleep, a foul, loaded tongue, irregular or disordered bowels, scanty urine, and sometimes jaundice, attend inflammation of the concave surface of the liver; and, if the ducts are implicated, the jaundice is generally complete.

118. *e.* If the *left lobe* is alone inflamed—a very rare occurrence — the more acute symptoms are referred to the left side. If this lobe is affected, the right is generally still more affected, and the local symptoms are correspondent, or are most severe towards the epigastrium. Flatulent distension of the stomach is sometimes urgent, and so great as to push the liver more than is usual to the right side, or to embarrass respiration. In these cases, the stomach often becomes implicated, if the lower surface of the lobe is inflamed.

119. ii. *Chronic inflammation of the liver* may be seated either in the *substance* or in any part of the *surface* of the organ. It may occur primarily, or the acute or sub-acute forms of the disease may have been so far subdued as to subside into a slow, inactive state. — *A.* When chronic hepatitis is *primary*, it is usually seated in the *substance of the organ*, often gives rise to few local symptoms, and occasions very slight constitutional disturbance. But *chronic* is a term conveying no precise idea, and merely signifies a slow state of disease, presenting every grade from that state which may be viewed as only slightly deviating from health. When chronic hepatitis follows the acute, it is usually seated in the substance of the organ; but it may affect the surface, or both. Inflammation may also commence in a chronic form, and, after an indefinite time, be aggravated into the acute state, either by the continued operation of the exciting causes, or by injudicious treatment.

120. As chronic disease of the substance of the liver may present every grade, down from the acute state to the slightest deviation from the healthy function, so the symptoms attending it must vary, and assume more or less precise characters. — *a.* In the *slighter* or more *obscure forms*, the nature of the disease is seldom evinced by distinct phenomena. Various dyspeptic symptoms, flatulency, acid or acrid eructations; sometimes nausea, and less frequently vomiting; loss of flesh; muddy or sallow complexion; dry cough, or embarrassed respiration; torpid state of the bowels; aching or pain in the back, or in the right hypochondrium, or a sense of weight or tenderness in the region of the liver; an irregular state of the bowels, or dark-coloured, offensive, slimy, greenish, or watery or muddy evacuations; dark or saffron colour of the urine; slight acceleration or irritation of the pulse in the evening; increased heat and restlessness in the night; heat of the palms of the hands and soles of the feet in the evening, and chilliness in the morning; white, foul, or rough tongue; bitter taste of the mouth; sickly or yellowish hue of the countenance; depression of spirits, and, in some cases, elevation of the shoulders, are the chief symptoms of this variety of hepatitis; but some of them may be absent, and others may be very slight or evanescent, or slightly manifest.

121. *b.* In the *severer states* of the chronic disease, the symptoms are often nearly the same as those attending the sub-acute form, only differ in degree, and more distinctly mark the organ and part affected; but, in the slighter cases, they are less precise, more equivocal, and less to be depended upon in forming a diagnosis. They may even preserve this character until the inflammation passes into suppuration, or a large abscess forms, when similar phenomena to those which indicate it in the more acute disease, begin to appear. Chronic hepatis, in any of its grades and states, is often *associated* with slight or chronic inflammatory *initation* of the *gastro-intestinal villous surface*, and hence several of the symptoms of both affections are associated in many cases.

122. *B. If the surfaces of the liver* become involved in this disease, the symptoms are then more distinct and acute.—*Chronic sero-hepatitis.* Pain or aching is more defined and marked; and as the superior, or the inferior surface is chiefly affected, so is it referred to the chest in the one case, or to the stomach and bowels in the other. When the superior and exterior part of the right lobe is affected, the patient then lies with most ease on the right side, and often feels at an advanced stage of the disease, more or less acute pain, or a dragging sensation, upon turning to the left. If this latter occur, the existence of adhesions between the liver and right side may be inferred. He therefore prefers the semicumbent position, or lies on his back or right side.

123. *C.* In many cases of chronic hepatitis, the disease affects both the *substance* and the *surface* of the organ, although either may be more especially implicated. In these, the symptoms are variously manifested. There is generally much loss of flesh, and frequently enlargement of the viscus may be detected. Tumefaction or enlargement may arise from three conditions: — 1st. from congestion, sanguineous or biliary, or both: — 2d, From the more chronic deposition of lymph between the lobules, or from other lesions of structure; and 3d, From suppuration and the formation of an abscess, or abscesses in the substance of the

organ. The *first* of these generally soon subsides after depletion and an active recourse to chologue purgatives; the *second* is more obstinate, is persistent, and attended by symptoms about to be noticed; and the *third* gives rise to a regular hectic remittent, and other phenomena, local and constitutional, which will be considered in the sequel.

124. iii. *Terminations or Consequences of Hepatitis.* — *A.* The *acute* and *sub-acute states* of the disease: — 1st. Terminate in resolution with a more or less gradual subsidence of the morbid phenomena: — 2d. They pass into the chronic state, and the various organic lesions connected with it: — 3d. They give rise to suppuration and its several states and consequences: — 4th. They may occasion exudations of lymph on some portion of the surface of the organ, and extension of the disease to adjoining viscera or parts, and 5th. and most rarely, The most acute state may produce gangrenous softening. The other changes observed, in consequence of acute hepatitis, are rather parts of the morbid process, especially in its progress to suppuration, as red and greyish softening of the structure, infiltration of the serum or of lymph, &c., as will more fully appear hereafter.

125. In the course of the disease and particularly of the more unfavourable cases, various *complications* arise, and favour a fatal issue. When suppuration takes place, such complications more readily and generally take place, and sometimes destroy the patient, or aid the hepatic malady in producing this result, even before the abscess has opened into any other viscus. Some of these complications may arise independently of continuity of surface, or anatomical connection or proximity, and entirely from the passage of morbid matter into the circulation, or over continuous surfaces, or from constitutional irritation, affecting parts predisposed to disease.

126. *B.* As in the more acute forms of the disease, so in the *chronic states*, several of the changes usually mentioned as terminations of hepatitis should be rather viewed as advanced stages of the inflammatory state, and others as the usual consequences of this state in certain constitutions or diatheses, since the morbid vascular action still continues, although somewhat modified in character or activity. Chronic hepatis: — 1st. May terminate in resolution, and a return of the healthy functions: — 2d. It may pass into the acute or sub-acute states, and the several resulting structural changes: — 3rd. It may give rise to suppuration and abscesses: — 4th. It may occasion enlargement and other organic lesions: — 5th. It may implicate the ducts and gall-bladder, and occasion various changes of them, of the bile, &c. with jaundice: — and 6th. It may give rise to various complications or serious maladies of adjoining or related organs, owing either to exudations of lymph on the surface of the organ, to the extension of inflammatory initation along continuous parts, to the irritation of morbid secretions on the intestinal villous surface, and to the absorption of such secretions into the blood. The most important of the above terminations and consequences of acute and chronic hepatitis, require a more particular notice.

127. *A. Resolution* is indicated by subsidence of pain, uneasiness, and fever; by the tongue becoming cleaner, the urine paler and more copious; and the stools more natural: and by the subsidence of the thoracic, or the gastric symptoms, according as either may have been present. Tumefaction of the organ also rapidly subsides, as shown by the extended clearness of sound on percussion, in the lower part of the chest; and by the diminished fulness and tension of the right hypochondrium and epigastrium. The existence of swelling is one of the chief indications of the persistence of the disease, in a less acute form, if the other symptoms are ameliorated, or of the supervention of suppuration.

128. *B. Abscess* is one of the most frequent and dangerous consequences of hepatitis, particularly in warm climates: and occurs chiefly in those insidious states of the disease which are not attended by acute symptoms, although often rapid in their progress. It may follow any grade of inflammatory action — the acute, subacute, and chronic; and it may occur with any rate of rapidity; but it is most frequent, and the most to be dreaded, in the sub-acute inflammation of the substance of the organ, attended with tumefaction and with much disorder of the bowels. It is especially favoured by the *scrofulous diathesis*, and sanguine temperament; and is with difficulty prevented when there is difficulty in determining whether affection of the liver, or dysentery is the primary disease, or, when if the former does not occasion the latter, it is a concomitant or a consequence of it, — when hepatitis is marked, at an early stage, with much swelling, oppression, or a dull aching, and much irritability of pulse towards evening, — when swelling, or fulness of the hepatic region continues, and more especially if it increase after the more acute symptoms are partially subdued, — and when the patient is exposed to hurtful influences during the treatment, or at an early period of convalescence, or indulges in stimulants, or too much food during this period, or before the healthy functions of the stomach and bowels are restored. In these circumstances, and in debilitated persons of a scrofulous diathesis and sanguine temperament — in the fair-haired and complexioned, the blue-eyed, the relaxed and enervated, those subject to bowel complaints and the sedentary, abscess often forms suddenly and unexpectedly, no very prominent symptom preceding or marking its occurrence. In these persons there is often little or no sign of existing inflammation, or the symptoms are ill-defined, by no means acute and equivocal, presenting more of a passive than of an active character, although the course of the disease is frequently rapid. In those, even when suppuration takes place, there is often no definite indication of its occurrence, although the physician may be aware of the existence of hepatitis. In these circumstances, patients often neglect themselves, until abscess has actually formed, and some consecutive disease, as dysentery and chronic diarrhæa, may have made its appearance, which may mark the primary malady, and engage the chief attention of both patient and physician.

129. On the other hand, the inflammation preceding abscess is often active, acute, and attended by evident local symptoms and inflammatory symptomatic fever, in strong, plethoric, and unimpaired constitutions. When the attack is very acute in these, particularly if the scrofulous diathesis is present, and if the organ be congested

and tumefied, abscess rapidly forms if the disease be not actively and promptly treated; and it is generally preceded and attended by symptoms, enabling the physician to prevent and to ascertain its occurrence. It is often owing to the diathesis, to previous disorder, or to some fault in the state of the organ, that abscess appears in these more acute and well-defined cases, when early and judiciously treated.

130. The pre-existence of *congestion*, sanguineous or biliary, or both, favours greatly the occurrence of suppuration as a consequence of inflammation of the liver. The previous congestion also increases the swelling generally consequent upon inflammation of the substance of the organ. When the swelling, or the signs indicative of it, attend the commencement of hepatitis, coincident congestion may be inferred; and, when they follow the disease, or appear at an advanced stage, they indicate the effusion or infiltration of lymph in the interstices between the small lobules, and denote a similar state of parts to that accompanying inflammation of more superficial and tangible glands, often, however, in connection with vascular and biliary congestion. When suppuration commences, and as it proceeds, tumefaction of the liver, fulness of the hepatic region, the sphere of dulness on percussion in the infra-mammary region of the right thorax, oppression, weight, and aching at the epigastrium and hypochondrium, are generally increased. When the increase of bulk, owing to incipient suppuration, is chiefly in the lower or concave part of the organ, it is less evident upon examination than when it is seated in the superior and outer portion.

131. *a.* When *suppuration* occurs the pulse becomes quicker and softer, or more irritable, and shiverings are often observed, either with or without perspirations. The countenance becomes pale, or sallow, or more sunk; the oppression, uneasiness, or weight in the hepatic region increases; and the perspiration sour or otherwise offensive. As suppuration proceeds the hectic fever attending it is more distinctly marked, and is never wanting. The other symptoms vary with the constitution and previous health of the patient, with the part of the organ diseased, and with various other circumstances. But when a large abscess is formed in the liver, or when it is seated towards the upper and outer portion of the right lobe, the following phenomena are usually observed: — 1st. Tumefaction of the organ, without any sign of fluctuation, but with a doughy, œdematous, or boggy feel of the hepatic region, or in some part of it:—2d. Distinct swelling or tumours below the margins of the ribs, or at or near the epigastrium:—3d. Bulging of the false ribs with increased fulness of the intercostal spaces:—and 4th. Fluctuation becoming more or less manifest in such tumours.

132. In some cases, the pain in the right side has been confined to a particular spot, which has corresponded with the situation of the abscess; and frequently increased heat has been felt in the part more especially tumefied. In a few instances the enlargement has been found low in the right hypochondrium, or even extending to the left hypochondrium, across the epigastrium. However, these local symptoms, if no fluctuation or doughiness be felt, and if the constitutional signs of suppuration be not present, may indicate only that state of parts about to pass into abscess, and may exist for some time before the local and general signs of this change present themselves.

133. *b.* The *constitutional symptoms* of abscess of the liver are often as equivocal as the local signs. In persons whose constitutions are broken down, in the phlegmatic and the scrofulous, the nature of the disease may altogether escape detection, until disclosed by *post mortem* inspection, more particularly when suppuration has followed chronic inflammation, and has been attended by dysentery or chronic diarrhœa. Rigors are not always complained of, but slight shudderings and formications are often substituted. When, however, they occur and are followed by copious night perspirations, after states of disorder above described, there being no reason to infer the existence of ague, they indicate the formation of matter in the organ. In some instances an internal sense of throbbing and fluttering in the region of the liver, followed by a soft pulse and night perspirations, with clamminess of the extremities, indicate this change, particularly when viewed in connection with the previous disorder and concomitant phenomena. In the advanced progress of abscess, cold sweats and faintness, or leipothymia, often occur, with anxiety and oppression at the præcordia. If these symptoms appear in a person whose system has not been affected with mercury, given with this object, we may the more certainly infer the existence of abscess. The impossibility of affecting the mouth by mercury when suppuration has commenced, is acknowledged by all experienced writers on the disease.

134. In connection with the hectic produced by abscess, the state of the tongue varies; but it becomes at last brown, red, smooth, lobulated, &c., or dry and parched. The stools are always disordered, and present in different cases, and at different periods in the same case, every possible appearance, with straining, tenesmus, discharges of blood from the bowels, and frequent calls to evacuation, particularly at night. When disease of the bowels becomes *complicated* with abscess, both the small and large intestines are affected; at first functionally and afterwards organically; and the patient is often carried off by the bowel disease, before the abscess has made its way either externally or into any other viscus. In some cases of hepatitis, in warm climates, associated with dysentery, especially of chronic hepatitis, the termination in abscess is either accelerated or caused by the sudden arrest of the dysenteric affection; or the hepatic malady becomes more severe and apparent as the affection of the bowels subsides.

135. In an advanced stage of abscess, especially when seated in the posterior parts of the liver, and pressing upon the diaphragm, anxiety and oppression at the præcordia become urgent, with attacks of dyspnœa and hiccup. The position preferred by the patient depends upon the seat and direction of the abscess. He most frequently reclines on the back, or on the left side, or in a semi-recumbent posture; and he sometimes has most ease when sitting and leaning forwards. Pain is a very uncertain symptom. During the tumefaction of the organ preceding the formation of matter, pain is often considerable,

and is afterwards converted into a beating or throbbing sensation, sometimes attended by shooting or darting pains in various directions, or merely by prickings chiefly in the situation of the abscess. In the more chronic cases, these latter sensations may be the only painful feelings complained of, unless occasionally on sudden motion, on sneezing, coughing, &c. The countenance generally becomes sunk, sallow, or jaundiced; and when jaundice does not appear, the eyes are generally either yellowish, or of a pearly hue. Emaciation increases, and is most apparent in the extremities, the upper regions of the abdomen appearing fuller than usual. The urine sometimes becomes turbid, and in rarer instances puriform or muco-puriform.

136. Suppuration of the liver, however, has occurred where the symptoms of hepatitis have not been observed, and where the abscess which has formed has not been suspected during life — pain, tumour of the hepatic region, jaundice, &c. not having been present. Instances of this kind have been recorded by many writers in this country, and by most of those who have treated of inter-tropical maladies. In many cases, the disease has not been recognised in consequence of the imperfect examination of the case; in others, from the complications or forms in which it has occurred. Its association with gastro-enteritis, with pneumonia, or with dysentery; or its appearing consequently upon continued or remittent bilious fever, or after ague, will sometimes entirely mask it from the superficial or careless observer. There is much truth in the remark of Mr. Twining, that he has never seen a case terminate in abscess without being able to detect the disease that is in progress by a careful examination before suppuration commences; but then, as Mr. Martin justly adds, the examination must be most rigorous, and repeated daily until we are quite satisfied as to the nature of the case.

137. Abscess may have formed in the liver, and *death* ensue before it makes its way beyond its seat. This result is owing: — 1st. To the constitutional irritation produced by it:—2d. To the absorption into the circulation of a portion of the puriform matter as it is formed:—3d. To the consecutive disease thereby occasioned in other organs. The hectic fever attending abscess is probably caused by the passage of the morbid matter into the blood, and the bowel disorder, which so frequently attends it, may be the result of this circumstance. There can be no doubt, however, that the disease of the bowels is sometimes so severe, and the organic lesions found in them so extensive, as to fully account for the death of the patient before the abscess had opened into any part. Consecutive disease in the lungs and in the brain may likewise be occasioned before abscess has made its way from the liver, and prove the more immediate cause of death. Pneumonia and coma are not rare in such cases.

138. When abscess makes its way beyond its seat, or through the coverings of the liver, the direction it takes much depends upon the part of the organ in which it is seated. If, in consequence of the absence of inflammation from that part of the surface or coverings of the liver, the seat of abscess, or of the inflammation not being productive of coagulable lymph, no adhesions are formed between the external surface of the abscess and the part opposite to it, the matter will be necessarily effused into the peritoneal cavity, where it will produce peritonitis. But if adhesions form through the medium of coagulable lymph with the parts opposite, the abscess will proceed accordingly and open into an adjoining viscus. Hence, abscess of the liver terminates as follows: — 1st. and most frequently *in death* — (*a*) owing to its effects on the constitution and to the complications induced without having opened or passed from the organs — (*b*) in consequence of having opened into adjoining parts, and of the additional disease thereby induced, as well as of the persistence or increase of the lesion of the liver; 2d. and more rarely *in recovery*—(*a*) in very rare instances, without opening of the abscess into adjoining parts, the matter having been absorbed and eliminated by the kidney — (*b*) after it has opened in certain situations.

139. The situations in which the abscess opens are: — 1st. Without having formed adhesions into the peritoneal cavity:—2d. Having formed adhesions externally through the abdominal parietes:—3d. Through the diaphragm into—(*a*) the pleural cavity — (*b*) the lungs and bronchi — (*c*) the pericardium:—4th. Into the stomach:—5th. Into the gall-bladder or ducts, passing thence into the duodenum:—6th. Into the colon, duodenum, or some portion of the small intestines, particularly the former:—7th. Most rarely into the right kidney, or into the vena cava. Certain of these terminations may be recognised during life, and recovery may take place in a few instances.

140. *a*. The *external opening* of an abscess of the liver is preceded by much swelling in the hypochondrium and epigastrium, and often by increased heat. As the matter makes its way to the surface, the swelling becomes less diffused, assumes more the form of a distinct tumour, and appears obscurely acuminated or concentrated, with a very deep-seated base, the integuments over its apex becoming discoloured and inflamed; and it becomes softer and more fluctuating in this situation, whilst it continues hard towards the base. The softness and the discolouration which takes place in the integuments over the apex or centre of the tumour, are the only indications which can be relied upon of the abscess having formed an adhesion to the external parietes of the abdomen, and are the only circumstances in which an operation should be resorted to; if they are absent, it ought not to be attempted. Owing to the neglect of these indications I have seen great mischief result from having recourse to an external opening; and I have further seen the tumour caused by a distended gall-bladder mistaken for an abscess, and an operation on the point of being performed. Owing to pressure on the common duct, or to permanent closure of it, the accumulation of bile in the gall-bladder may produce so great distension of it as to simulate abscess of the liver so closely as to be distinguished from it with great difficulty. The distension of the gall-bladder may even be associated with or caused by abscess, in which case the diagnosis becomes still more difficult, as all the antecedent and concomitant symptoms of the latter are observed. But attention to the indications just named will guide the physician aright. The *diagnosis* is very fully stated in the article Gall-bladder (§ 22.). The abscess may make its way externally, not only at the margins of or be-

low the ribs, but also by a fistulous opening between the ribs, or beneath the axilla, or in the back.

141. *β*. The passage of matter from an abscess in the liver *through the diaphragm* into either the *pleural cavity* or into *the lungs*, is not infrequent. In these cases the peritoneal surface of the diaphragm adheres to the part of the covering of the liver external to the abscess, and generally a similar adhesion of the opposite surfaces of the pleura also takes place, and the matter passes into the bronchi. In this case the patient sometimes recovers; but, in the comparatively rare instances of the effusion of the matter into the pleura, fatal pleuritis results. When the matter is about to make its way into the lungs, many of the symptoms of *diaphragmitis* and of *pleuritis* of the diaphragm are present, with severe dry cough, pain, constriction, and oppression at the base of the thorax, hectic fever, hiccup, anxiety, dyspnœa, rarely jaundice, the semi-recumbent or sitting posture, and absence of the auscultatory signs of pneumonia; and, as soon as the abscess bursts into the bronchi, the patient experiences a sudden feeling of suffocation, followed by a copious expectoration of puriform matter, attended by diminution of the swelling, fulness or tumour in the hepatic region; the lung (commonly the right) into which the abscess had burst having lost its respiratory murmur, and become dull on percussion. Generally as the matter is evacuated the lung recovers, or partly recovers, its permeability, the bronchi emptying themselves in the course of two or three days. The passage, however, of matter into them induces more or less bronchitis, which often continues, even in the most favourable cases, for a considerable time. The matter expectorated in such cases is usually well-formed pus, but it sometimes is mixed with some blood.

142. *γ*. When abscess points upon the *stomach* or *duodenum*, there are generally much diffused swelling and hardness at the right hypochondrium and epigastrium, frequently jaundice, urgent and distressing vomiting, especially soon after substances are taken into the stomach, occasionally attacks of dyspnœa, difficulty of swallowing, flatulent eructations, and singultus. After an exacerbation of these symptoms, with clammy perspirations, coldness of the extremities, &c., the patient throws up a quantity of purulent matter, sometimes mixed with a little blood, and the hepatic swelling subsides.—When the abscess opens into an *intestine*, diarrhœa suddenly appears, the stools consisting chiefly of purulent matter. When there is only a single abscess of the liver, and the organ is not otherwise diseased, and the malady no further complicated, the opening into the alimentary canal may close and the patient ultimately recover; but more frequently a fistulous opening remains, and matter continues to be discharged from time to time until the patient sinks.

143. *δ*. Of the opening of the abscess into the peritoneal sac, or into the pleural cavity, or in any other situation, it is unnecessary to offer any remark. Of these, rupture into the abdomen is the most frequent. When this occurs, the consequent peritonitis is most acute. Cases have occurred of rupture of the abscess both into the digestive canal and into the peritoneal cavity. A case of this kind is recorded by Dr. STOKES; and one has been adduced by Dr. GRAVES, where the abscess opened into the stomach by three perforations, and also into the pericardium. Cases have also been recorded of an abscess making its way both into the lungs and into the bowels; and others have occurred when it has been opened externally and afterwards burst into the digestive canal or some other situation. In these cases there have probably been more than one abscess.

144. *C. Chronic enlargement of the Liver* is a frequent consequence of inflammatory states, particularly of repeated attacks of chronic inflammation, and even of the several states of congestion and of functional disorder, complicated with or consequent upon remittent and intermittent fevers. The liver is generally enlarged in a gradual manner, but also so perceptibly as hardly to be mistaken. Its function is much impaired, the bile being scanty and depraved. The urine is also much disordered. A frequent, hacking, dry cough, a sallow pasty complexion, dyspepsia in various forms, emaciation, general ill health, and cachexia, with lowness of spirits and despondency, are usually present. A careful examination of the hepatic region, and due consideration of the history of the case, will enable the physician to *distinguish* this *state of disease from chronic pleurisy with effusion*, with which some writers believe that it may be confounded.

145. The *diagnosis* insisted upon by Dr. STOKES as marking the differences between these two diseases may be here noticed:—in both, the physician will find extensive dulness of the side on percussion, absence of respiration, and the other stethoscopic signs nearly the same, with a full or dilated side and decubitus upon it. The swelling in the hepatic region may be the same, that arising from displacement nearly equalling that caused by enlargement of the organ. But, when the side is dilated by a fluid, the intercostal spaces are raised either to a level with the ribs or even protruded beyond them, and the side has a smooth and rounded appearance. "On the other hand, when the dilatation is caused by a solid tumour, the reverse of this occurs: the pressure being made upon the ribs, these are pushed outwards, but the intercostal spaces preserve their relative positions with them, and the side does not present any thing of the smooth and rounded appearance described." Dr. STOKES, however, places more reliance upon this distinction than it deserves—and it altogether forms a piece of nice speculative diagnosis, which will not be generally realised in practice; for, as I have observed for many years, however firm or unyielding the enlarged liver may be, it is rarely such if the enlargement be considerable, as not to be indented by the pressure of the ribs, and thus to protrude the intercostal spaces as much as fluid effusion. Attention to the extent and sphere of dulness on percussion, in different positions, to the history of the case, and to the *toute ensemble* of phenomena, will be a surer guide to the thinking observer than dependence upon single points, however nicely distinguished.

146. There is often greater difficulty in distinguishing the chronic enlargement of the liver now under consideration from that attending or preceding abscess; and the importance of the diagnosis is sometimes great. In both instances there is enlargement; therefore, as to this, no distinctions can be offered. The questions are, 1st. Is an abscess formed? and if this be answered in the negative; 2d. Is there one about to form? The

answer to the *first* question can be made only from the evidence of abscess above furnished (§ 131. *et seq.*), or from the want of such evidence. The answer to the *second* question is furnished by the symptoms of inflammation preceding suppuration, by the symptomatic fever, with the other phenomena attending it; and by the general and local symptoms of chronic enlargement. In the former we have more or less evidence of inflammation in a state of progression: in the latter, the consequence only of inflammation is presented to us, the increased vascular action that occasioned it and the attendant fever having subsided. In chronic enlargement there are more decided proofs of general cachexia furnished, which are either not seen, or seen only in a less degree, in the enlargement preceding suppuration.

147. *The changes observed on dissection* of fatal cases of *hepatitis* and *its consequences* are fully stated in the section on the *Structural Lesions presented by the Liver.*

148. iv. THE DIAGNOSIS OF HEPATITIS will not detain me, as the descriptions given above comprise the chief distinctions between those states and consequences of the disease and other maladies which most closely resemble them. A very slight attention will distinguish between *gastro-enteritis*, or *duodenitis*, and *hepatitis*. The seat of pain or uneasiness; the swelling in the hepatic region; and the inflammatory character of the symptomatic fever, with the attendant phenomena, will point out the disease. In *gastro-enteritis* these characters are wanting, the fever attending it being more adynamic than in hepatitis. (See art. GASTRO-ENTERIC DISEASE, §§ 12, 13.)

149. The details furnished above also serve to distinguish *chronic pleurisy* with effusion from *chronic enlargement* and from *abscess of the liver*, as well as the differences existing between the several functional and inflammatory affections of the organ.

150. v. COMPLICATIONS OF HEPATITIS. — The several states and consequences of hepatitis very frequently occur in connection with other diseases, the hepatic malady being either *primary* or *consecutive* of these diseases. Although I cannot, within my limits, describe the several *complications* which thus arise, yet I will briefly notice the chief of them, as the mere suggestion of them will often lead to their recognition in practice, and to the not unimportant inquiry into the nature of their connection and succession.

151. *A.* I have already mentioned the great influence of *remittent* and *intermittent fevers* in causing *hepatic disease.* In many cases, the latter is almost coëtaneous with the former; and, in some instances, hepatic disorder precedes the periodic fever, and becomes developed into acute inflammatory, or even structural, disease, as the fever proceeds. In these the fever presents more or less of what has been called the bilious character; and the specific cause of the fever superadds a constitutional malady to the local affection, and thereby aggravates it. Such complications soon become familiar to physicians in warm miasmatous climates. Again, in many instances, the hepatic affection is developed in the progress of the fever, and in others it does not appear, until the decline of, or during convalescence from, the latter. In these circumstances, the substance of the organ is principally affected, and the form and course of the local disease are frequently obscured. In all cases of periodic fever, therefore, and especially if the attacks have been frequent or prolonged, the functions and state of the liver, and the region of the organ, should be carefully examined both during and after the disease. (See FEVERS, REMITTENT.)

152. *B.* The *complication of hepatitis* with *dysentery*, *diarrhœa*, or *gastro-enteric disease* is one of the most frequent and most important which comes under the observation of the inter-tropical and Indian physician. The association often escapes observation, owing to the seat and nature of the hepatic malady; and the exact procession of the morbid changes is seldom so manifested as to admit of recognition. In some cases, the morbid secretions from the liver, either attending or preceding imflammatory disease in it, seems so to irritate the gastro-intestinal mucous surface as to inflame, and ultimately to disorganise, it. In others, disease of both the bowels and the liver appears to be contemporaneous; and in many the gastro-intestinal irritation is primary, and seems to be propagated from the duodenum along the ducts to the substance of the liver. This is, however, not so frequent a mode of extension as is supposed by some pathologists. In most cases of the association of hepatitis with dysentery or diarrhœa, this can hardly be considered to obtain; and although the vitiated secretions from a diseased liver may irritate and inflame the internal surface of the large bowels, thus occasion diarrhœa or dysentery, and indicate the priority of affection to be in the former viscus, still other instances will, if accurately observed, show an opposite course of disorder to this, namely, indications of diseased liver appearing either in the course, or upon the decline or disappearance, of the dysenteric affection. In these cases it has been supposed, that, phlebitis having been produced in the veins arising in the ulcerated bowel, it has been propagated to the portal vein and its ramifications, giving rise to infiltrations of pus in the interstices between the lobules, that have ultimately formed themselves into larger collections or abscesses. Others again believe that morbid secretions or other matters have been imbibed by the veins, and, mingling with the blood, have been carried to the capillaries of the liver, where they have excited suppurative inflammation in the substance of the organ.

153. Without denying the probability of either of these views, a change closely allied to them evidently takes place in many cases, and the purulent collections so often found in the liver after chronic dysentery bear the same relation to that disease, as other consecutive or symptomatic abscesses bear to maladies in which phlebitis occurs, as erysipelas, &c. In dysentery therefore it may be inferred, that, in the progress of ulceration, phlebitis of the capillary veins of the bowels sometimes occurs; and that the matter or pus thus formed in these veins passes with the blood into the portal circulation, where it irritates or inflames the minute ramifications of the portal vessels and the structure of the liver, giving rise to purulent infiltrations and collections in the organ, similar to those consequent upon phlebitis in other parts, but always occurring in the liver, and there only, because the morbid matter passes directly from the bowels into the portal circulation. As in other forms of con-

secutive or symptomatic abscess of the liver, so in this, the formation of matter is unattended by active or acute symptoms, or by the tumefaction of the organ generally preceding abscess consequent upon primary or active inflammation of it, as described above. (See section on *Structural Lesions of the Liver.*)

154. *C.* Of the association of inflammation of the liver with *gastritis*, some notice has already been taken (§ 118.). The extension of the disease from the concave surface of the organ to the stomach is not unfrequent, even without an abscess having formed; and in these cases the gall-bladder, ducts, and even the duodenum, are sometimes involved. More rarely, the inflammation seems to have extended from these parts to the concave surface of the liver, as shown by extensive organic lesions in the former, and by adhesions to the latter. In several instances of chronic disease of the digestive organs, with complete jaundice and obstruction of bile, with vomitings, &c., I have found the duodenum, the pylorus, and sometimes a portion of the stomach, firmly adherent to the liver; the pancreas greatly enlarged; the gall-ducts involved in the disease; the pylorus thickened and indurated, and its caliber remarkably reduced; the stomach enormously distended; the liver and gall-bladder variously altered, and the hepatic ducts loaded with dark bile. (See art. GALL-BLADDER AND DUCTS, §§ 18—24. *et seq.*)

155. vi. PROGNOSIS.—*A.* In the *acute* and *sub-acute states* of hepatitis, the prognosis will depend upon the part of the organ especially affected, and upon the progress and consequences of the disease. In temperate climates, when hepatitis is treated early and is duly recognised, it terminates favourably in most instances — probably in thirty-nine cases out of forty; but in warm climates, and especially in the East, the proportion of fatal cases in those attacked by the disease varies from 1 in 20 to 1 in 7 *, as shown in the subjoined abstract from the returns made to the Army Medical Board. In warm climates, the natives are less subject to hepatitis than the inhabitants of temperate countries.

156. The circumstances which more particularly *indicate danger* are, the occurrence of the disease in cachectic, broken-down, or debilitated constitutions, especially among Europeans resident in warm climates, or in those previously the subjects of hepatitis; its affecting the substance of the organ, and its insidious progress and association with other diseases, especially with those of the bowels; its advanced progress before treatment had been prescribed, and the failure of judicious means employed at an early stage; and symptoms of incipient or advanced abscess, and fully developed hectic phenomena;—in short, whilst the symptoms of resolution (§§ 128.) show a favourable termination of the disease, those which attend the other terminations and consequences of it (§§ 129.) evince more or less risk; and, although they may not indicate extreme danger in several circumstances, and in many cases, yet in others, particularly where suppuration and hectic have been established, the chances of ultimate recovery are but few.

157. *B.* The prognosis in the *chronic states* of hepatitis varies with the changes and consequences of the disease, as manifested in different forms, stages, and cases of it; and depends upon circumstances connected with the patient and with the causes which produced the malady, as well as with those which may still continue to perpetuate or to aggravate it. Hence the physician will be guided in forming his opinion, not only in this form of the disease, but also in the acute and sub-acute states of it, by circumstances so numerous and varying, as to preclude the possibility of adverting to them with sufficient or satisfactory particularity. The soundness of his prognosis must necessarily depend upon the accuracy of his diagnosis, and of his recognition of modifying, exasperating, or countervailing circumstances and influences — upon his natural acumen, knowledge, and powers of observation.

158. vii. TREATMENT.—*A.* In the *acute* and *sub-acute states* of the disease, the propriety, and indeed necessity, of having recourse to energetic measures as early as possible are manifest. In warm climates, the delay, even of a few hours, may place the patient in danger. The first and most important means of cure is *blood-letting*; and, especially when the substance of the organ is affected (§§ 101.), it should be promptly and energetically practised. Mr. MARTIN justly observes that, " however long the disease may have existed, *provided there be no symptoms indicative of suppuration*, general blood-letting — repeated as the symptoms may demand — and copious in relation

* STATIONS.	Aggregate Strength during many Years.	Attacked with Hepatitis and Jaundice.	Died.	Proportions of Deaths to Admissions.
Canada - - - - - - - -	64,280	488	12	1 in $40\frac{2}{3}$
Nova Scotia and New Brunswick - - -	46,442	384	10	1 in $38\frac{2}{5}$
Gibraltar - - - - - - - -	60,269	759	22	1 in 34^{5}
Ionian Isles - - - - - - -	70,293	1168	58	1 in 20
Malta - - - - - - - -	40,826	857	47	1 in 18
Bermudas - - - - - - - -	11,721	168	6	1 in 28
Windward and Leeward Command, West Indies -	86,661	1946	161	1 in 12
Jamaica - - - - - - - -	51,567	539	51	1 in 11
Western Africa - - - - - - -	1,843	150	11	1 in 14
St. Helena - - - - - - - -	8,973	171	24	1 in 7
Cape of Good Hope - - - - - -	22,714	496	25	1 in 20
Mauritius - - - - - - - -	30,515	2508	122	1 in $20\frac{1}{2}$
Ceylon - - - - - - - -	42,978	2382	213	1 in 11
Tenasserim Provinces - - - - - -	6,818	488	29	1 in 17
Bombay - - - - - - - -	17,612	1084	62	1 in $17\frac{1}{2}$
Bengal - - - - - - - -	38,136	2412	174	1 in 14
Madras - - - - - - - -	31,627	3372	190	1 in $17\frac{3}{4}$

to age, health, and length of residence in India, must be instantly had recourse to; and the measure of depletion should be the sense of local and general relief, *with softening of the skin.*" This advice is equally applicable to the acute hepatitis of other warm climates, and of temperate countries. The patient should be seen in from six to eight hours after the first bleeding; and if vascular reaction has returned or has increased, as often observed, venesection must be again prescribed and performed, in the manner so often advised in this work.

159. Instantly after the first blood-letting, a full dose of calomel, conjoined with James's powder, or with some other preparation of antimony, ought to be given, generally in the form of a powder, and a saline purgative should be taken a few hours afterwards. These may be repeated at intervals, according to their effects, until the system be brought under the moderate influence of mercury. In the course of treatment, local depletions may be required. When this is the case, *leeches* may be applied to the anus, or to the hypochondrium or epigastrium, and be followed by fomentations and poultices; or cupping may be performed under the shoulder-blades. *Blisters* are generally beneficial when applied after vascular depletions have been duly practised; but they should not be employed until depletions are no longer required. During the treatment, the more cooling diaphoretics should be given at short intervals, and in such doses as will not offend or irritate the stomach.

160. The above comprises the most efficient means of treating the more acute states of hepatitis; yet there are others which are powerful aids; and one of those which have been mentioned requires more particular notice, as respects not only the propriety, but also the mode of prescribing it. I shall, therefore, and particularly on account of the great importance of the matter, consider the latter of these subjects before I discuss the former, and examine the questions: — 1st. *As to the propriety of employing mercurials in hepatitis: — and,* 2d. *As to the mode of prescribing them in cases where their use appears to be required.*

161. *B. Of the Use of Mercurials in Hepatitis.* — *a.* The question, as to *the propriety of employing these medicines in hepatitis,* has been very generally answered in the affirmative by most physicians; and yet few agree as to the states of the disease in which they either should, or should not, be prescribed. There can be no doubt that these medicines have been employed, especially in India, in a most indiscriminating and empirical manner, and to a most injurious extent; and that even those who have used them the most liberally have themselves had no precise idea of their modes of operation, and even of the existing pathological conditions for which they were prescribed. Some physicians in the East Indies have contended, that hepatitis there is a different disease from that which occurs in this country; and, consequently, that views of the treatment of it in the one climate cannot be extended to the other. This, however, is only partially true: it is essentially the same malady, although occasionally somewhat modified, in both climates; and the principles of practice are the same in both, for similar states of the disease, slight alterations only being required, arising out of the persistent influence of the causes producing it, and the circumstances of individual cases. The mistakes and numerous evils to which they lead, of considering the hepatic diseases of India to be different from those of Europe, and of employing mercurials empirically in their cure, will soon become manifest to the practitioners in the former, if, indeed, they are not already manifest to many, and especially to the best educated and the most enlightened. I know, from repeated observation, that inflammations of the liver may be cured without mercury in this country, quite as well, as safely, and as quickly, as with it; but that there are certain states and consequences of these inflammations that require this medicine, and that are benefited by it more rapidly than by any other; and I believe that the same will be found to be the case in India, and in warm countries in general.

162. Some physicians prescribe mercurials in hepatitis with the intention of emulging the bile-ducts; others simply as a purgative; and some with the same view as in other inflammations, when it is desired to affect the constitution with them, and thereby to change the state of capillary action in the affected organ. Now these several views have been promulgated without any examination of the mode of operation of mercurials upon the biliary organs, and upon the assumption that they actually excite the organ, and enable it to discharge its functions. This assumption has arisen from the circumstance of an increased discharge of bile having followed the exhibition of them in many cases where this secretion appeared to be impeded or interrupted. Even those very writers who have argued for this mode of operation of these medicines, have employed them most inconsistently with their own views — even for acute inflammations of the liver, where, according to these views, they must have aggravated or perpetuated the morbid action which they were given to subdue.

163. Mercurials, like most other medicines, when employed in small doses, exert a *stimulant* influence for a short time upon living tissues; but, in large doses, this effect is either rapidly exhausted, or hardly produced, and a *sedative* operation results, which is the chief or the only effect usually observed. In doses either small or moderately large, they also exert a *qualitative* or *alterative influence,* relatively to the state of vital energy and vascular action, that becomes more and more manifest the more frequently they are prescribed, and the shorter the intervals between the doses. All the milder preparations, and the more acrid ones in a state of dilution, produce upon the capillaries of the parts to which they are directly applied, somewhat of an astringent effect, resulting most probably from the influences already assigned to them; these preparations diminishing for a time the vascularity of the surface, and modifying its vital actions. This is shown by inflamed or vascular surfaces becoming less inflamed and less vascular soon after calomel and the other milder preparations of mercury are applied to them. Such, then, appear to be the changes produced by the usual medicinal doses of mercurials upon the states of vital energy and vascular action of parts to which they are more immediately applied, — such, I infer, are their *topical*

effects upon living structures, in health and in disease; provided, however, that the vitality of the part be not remarkably depressed, or capillary action not altogether suppressed. Vital agents cannot influence dead structures, or structures approaching to this state, unless in as far as they may exert a chemical action, and then this action is confined chiefly to their antiseptic or septic agency, by combining with the tissues or with the fluids they contain.

164. The *consecutive* or *constitutional effects* of mercurials are equally important, and ought always to be considered in connection with the topical effects; for the former, in some cases, rapidly follows the latter, whilst in others they are produced with difficulty. The circumstances connected with this uncertainty of the consecutive operation of mercurials will be attended to hereafter. Having produced, or whilst producing, their topical changes, mercurials are absorbed and carried into the circulation from the external surface of the body, by means of the absorbents, and from the digestive canal, either by the lacteal absorbents or by the veins — if by the last, they will necessarily pass almost directly into the portal circulation. When carried into the blood, their effects are manifested with greater or less rapidity and intensity, according to existing states of vascular action and vital power; but, in ordinary circumstances, and in a time which bears some relation to the frequency and largeness of the dose, they affect these states; increasing the frequency, and impairing the tone, of the former, and depressing the latter; and, ultimately, they weaken or otherwise change the crasis or coagulability of the blood, and even the vital cohesion of the several tissues.

165. Owing partly to their local influence, and the sympathetic extension of that influence, and partly to their absorption, mercurials soon increase the exhalations and secretions from the cutaneous and mucous surfaces, and the secretions of glandular structures, whilst they diminish exhalation into serous or shut cavities. Those secretions in which are excreted effete or injurious materials from the blood, as the bile, the salivary and pancreatic fluids, the menstrual discharge, &c., are especially augmented by large or repeated doses of mercurials; nutrition, however, being impaired, and absorption increased, especially of interstitial or imperfectly organised deposits. If the exhibition of these medicines, in frequent or large doses, be persisted in, these effects become more manifest: secretion and excretion, more especially salivary secretion, are greatly augmented; the crasis or coagulability of the blood, that is often increased at first by them, is afterwards either weakened or altogether lost; vital cohesion is remarkably impaired in some tissues, so much so as to amount to gangrenous softening and sphacelation; the flow of the saliva becomes excessive; absorption and vital exhaustion are rapidly augmented; and low irritative fever, consequent upon these latter conditions and the transit of morbid or effete elements into the circulation, during the rapidity of absorption, exhausts and ultimately sinks the patient, either with or without certain local effects of a still more remarkable nature, as sloughing of the gums and cheeks, caries of bones, &c.

166. These being the local, consecutive, and progressive effects of mercurials, their influence upon diseases, particularly those of glandular organs and serous membranes, may be more accurately inferred. From these effects we may explain their beneficial influence in many instances of inflammatory irritation or action in the villous coat of the stomach and small intestines, when taken internally; and their good effects, when given in repeated doses for the removal of inflammation of serous membranes and its consequences.

167. In the acute and sub-acute disease of the membranes or surface of the liver (§ 113.), large and repeated doses of mercury are often most beneficial, not only in equalising and lowering excited vascular action, but also in diminishing or preventing the exudation of lymph on the inflamed surface, especially after vascular depletions have been duly resorted to. When the substance of the liver is inflamed, a similar recourse to mercurials is not so generally advantageous, unless the inflammation be consequent upon, or attended by, active congestion of the organ or accumulations of bile in the biliary ducts, and blood-letting has been largely premised. When the pulse is quick, soft, and irritable, and the bowels much relaxed or dysenteric, mercurials are frequently more injurious than beneficial; and attempts then made to produce their usual effects upon the mouth and salivary glands are either unavailing, or productive of injury by accelerating the accession or progress of suppuration.

168. The propriety of having recourse to mercurials in the more acute inflammations of the liver depending thus upon the peculiarities of individual cases of the disease, general rules as to the employment of them cannot be stated with sufficient precision. Much should depend upon the pathological deductions formed by the physician as to each case which comes before him. Authorities on the subject are contradictory, and are more calculated to perplex than to guide the inexperienced.

169. Formerly mercury was employed in hepatitis, by Indian practitioners, as a substitute for blood-letting. The injurious effects of this practice were first exposed by DR. BALLINGALL. About the same time or soon after he wrote, I endeavoured to show that mercurials should be employed only to aid not to supersede blood-letting, to remove accumulations of bile in the biliary passages and liver, and to restore the secreting functions of the organ. Many of the writers on hepatitis during the latter part of the last century and the early part of this, relied solely or chiefly upon the use of mercury for the cure of hepatitis, and yet had no precise ideas as to its operation, beyond the production of its specific effects; and the majority of them, moreover, never discovered, notwithstanding the extent of their unfortunate experience, that it was difficult to produce these effects whilst inflammatory reaction continued, and almost impossible when suppuration had commenced. Still, believing or being told that mercury was the cure for the disease, they continued to dose their victims with it in every instance and in all circumstances, actually producing thereby most of the unfavourable consequences of the malady and other serious affections of related organs. The rectum-operators of the present day have been under no small obligations to the calomel and mercury hallu-

cination of the last half century, for the extensive field of practice with which it has furnished them. Nor have they alone experienced the bliss of the practice, for both East Indian and British practitioners have in some way or other reaped the advantages accruing from it and from the happy ignorance which frequently, if not generally, prompted it. The slightest *dyspeptic*, often denominated *hepatic* disorder, was a sufficient indication, with the great mass of the profession, for the exhibition of five or six grains of calomel every night or every other night in this country, and of twenty grains every night in India; and the tenesmus and other consequences of irritation of the rectum thereby produced, were rarely recognised as the necessary results of the practice, but viewed as a part of the disease requiring only a repetition of the same means for its removal, until fatal dysentery, abscess of the liver, or other disorganising lesions were produced, and the fatal issue, which ultimately supervened, was most innocently and complacently viewed as the uncontrollable course and consequence of the malady, instead of the common result of a treatment prescribed with complete ignorance of the nature of the disease and of the operation of the means used to cure it. This is no over-charged statement. Numerous proofs of it have fallen under my observation in this country. I have seen still more numerous proofs of it in the hospital books kept at an East Indian Presidency, and some of these books I can still refer to and even produce. There is, perhaps, no other disease that more fully proves how very little mere experience — the blind experience of exclusive practitioners, incapable of close observation and legitimate deduction — serves the advancement of real knowledge, than the history of the treatment of hepatitis during the last seventy years. The following abstract of the opinions of a few of the many writers on diseases of the liver, — of those more especially enlightened by Indian practice and extensive experience, — shows the amount of obligation which is still their due.

170. Mr. ANNESLEY recommends twenty grains of calomel to be given at bed-time, and a purgative in the morning, daily. In some cases, and especially in those where the membranes are chiefly affected, or where bilious engorgement of the liver exists, two or three or even more of such doses may be of service; but there are other cases, equally numerous with the foregoing, where this practice, continued as Mr. ANNESLEY advises it, until salivation is produced, would be more injurious than beneficial, or even most dangerous or fatal. Dr. CHAPMAN, on the other hand, in advising small doses of calomel, considers, with considerable truth, very large doses to be productive of debility, irritation, and the irregular febrile movement caused by irritation. Mr. MALCOLMSON, Mr. B. CLARK, Dr. DICK, and others, also consider large doses of calomel to be injurious in a large proportion of acute cases, and in a still larger proportion of chronic cases, and are of opinion that disease of the liver is more apt to return when thus treated. Mr. TWINING, also an Indian practitioner, believes mercury to be of no greater efficacy in hepatitis than in other inflammations, in most of which it is secondary and subsidiary to bloodletting. In answer, however, to Mr. TWINING, Mr. MARTIN remarks that "It is for the very reason that calomel assists powerfully both in '*drawing off*' accumulations, and in procuring '*increased secretion*,' that it proves of such value in aid of blood-letting (in hepatitis). In short, it is by this very double action of purging and increasing secretion at the same time, that mercury relieves the loaded and inactive vessels of the diseased gland, — not to speak of the other acknowledged influences of this mineral, such as its increase of *all* the secretions and excretions of the body, — its influence on the capillary circulation — its febrifuge effect — the peculiar specific power ascribed to it by GOOCH and other authors as an antagonist to inflammations, whether general or local — its power over the absorbent function — its power of unloading at the same time that it gives a new impulse to the vascular system — its peculiar power in removing viscid and tenacious intestinal secretions — its alterative and solvent effect on the blood — these are the uses and actions ascribed to mercury by the ablest of our physicians and surgeons, and they are such as place this remedy second only in order to blood-letting, in all the more acute hepatic affections of India." Mr. MARTIN has here given a favourable and an able view of the operation of mercury; but the practitioner cannot expect to find it fully realised in more than a portion of the cases in which he will employ this mineral. Still, in those acute cases where these effects require to be produced, there is no other substance that can be so well depended upon as it when judiciously administered. Nevertheless, whilst we endeavour to obtain these effects, we must not overlook its more injurious influences and neglect means or ways, in respect both of dose, mode of exhibition and combination, that may prevent or counteract them.

171. Dr. SAUNDERS remarks, that it is a matter of dispute amongst those who recommend calomel as a specific in liver complaints, "whether it acts by purging or by exercising any local operation on the biliary ducts, or by acting on the general system, and ultimately by salivation, it being a prevailing opinion, that when the system is impregnated with mercury, suppuration of the liver seldom takes place;" but the question is not as to which of these ways the medicine operates, but as to whether or not it acts in all these ways, producing moreover other effects, such as have been already particularised, certain of these effects being more prominently produced in some circumstances and cases than in others.

172. *b.* The question, then, is not so much as to the propriety of exhibiting mercury in acute hepatitis, after blood-letting has been duly premised, and repeated in cases requiring its repetition, for that is very generally conceded with the exception I have made above (§ 167.), but as to the quantity and manner in which it should be given. Although the difficulty of answering this question has been already shown (§ 170.), yet some have attempted to answer it with more precision and universality of application than is compatible with the rational employment of medicinal agents to control morbid actions. On the one hand, we have Mr. Annesley's twenty grain doses of calomel which are sometimes required, but which have been recommended by him as the almost only mode of employing this medicine: on the other, we find Mr. CURTIS, another Indian

practitioner, advising only three grains of calomel to be given with four each of soap and rhubarb, every night and morning, in which combination the calomel is decomposed and the patient takes only the oxide of mercury. In many cases, this latter plan will be preferable, especially when it is desired, as in states of inaction of the liver consequent upon inflammation or connected with congestion, infarction, or enlargement, to stimulate the functions of the organ and promote the absorption of morbid deposits; but in other cases, where the objects are to derive from the seat of disease, and to arrest with the utmost speed inflammatory action and its consequences, scruple doses of calomel every night, or smaller doses taken more frequently, will be more efficacious. Many years ago I stated, as a reason for exhibiting mercury with decision, in order to arrest the progress of hepatitis, that the salivation thereby produced and the determination of the fluids to the salivary glands, acted as a powerful derivative from the liver, allowing the morbid action in this organ to subside, and the healthy functions to be restored.

173. *c.* Another question suggests itself—namely, are there other means which may be used in aid of blood-letting, or after vascular depletions have been carried sufficiently far, in order to procure a free discharge of bile, and prevent suppuration? I believe that there are, although further experience is required to determine fully the extent of benefit to be derived from them, and the particular circumstances in which they are more especially indicated. Some of these may be employed either as substitutes for, or in aid of, mercury; the mercurial being taken at bed-time, and the other remedies in the morning and course of the day. Amongst these the bi-tartrate of potass is the most efficacious in promoting a discharge of bile, in removing viscid and tenacious secretions from the intestinal mucous surface, and in lowering inflammatory action. It should, however, be prescribed in full doses—from one to three or four drachms twice or thrice daily, in the form of electuary; and it is often advantageously conjoined with small doses of tartarised antimony, or with biborate of soda, &c., according to circumstances. The *sulphate* and *bisulphate of potash*, the *phosphate of potash*, the *nitrate of soda*, and other neutral salts, are also of service when given in full or frequent doses, and judiciously conjoined with appropriate medicines.

174. *C. Acute hepatitis affecting Europeans residing in the East Indies or in warm climates* requires a similar treatment to that already advised; the only difference being the necessity of greater activity and promptitude in the use of the means of cure. *Blood-letting*, general or local, or both, should be freely practised. A full dose of calomel — from ten to twenty grains — may be given at bed-time, as it will not disturb the rest of the patient by its operation, but will act upon the secretions until morning, when a brisk purgative should be taken, to carry off accumulated fæces, and those morbid secretions which the calomel had prepared for removal. The purgative that may be given in the morning may be either any of the saline solutions above-mentioned, or the compound jalap powder, or the Seidlitz powders.

175. In warm climates, the rest of the patient ought not to be disturbed by the operation of purgatives during the night; and, when it is necessary to continue the mercurial without disturbing the patient, it may still be given with one or two grains of opium, and with one grain of ipecacuanha, if the stomach be not irritable. In some cases, particularly when the bowels are irritated, an anodyne draught, or an anodyne enema, may also be administered at bed-time. These precautions against disturbing the patient during the night require especial attention in some localities, and where there is a free ingress of the night air, and where the nights are cold, damp, and chilly.

176. If the calomel at bed-time, and the purgative in the morning, saline diaphoretics and refrigerants being given in the course of the day, be followed by affection of the mouth, as usually happens in the course of three, four, or five days, when vascular depletions have been duly premised, then it is sometimes necessary to induce ptyalism as quickly as possible, particularly in the circumstances, and with the exceptions, above noticed (§ 167.). The reason which influenced me in thus recommending the speedy induction of ptyalism for inflammation of the substance of the liver, conjoined with vascular or biliary congestion, was, that where the full operation of mercurials on the system and ptyalism are induced speedily, a derivation from the seat of disease is effected, and the functions of the liver are more readily and completely restored. But, if these effects are not soon produced, the means should be relinquished. If there be any reason to believe that suppuration has commenced, symptoms of it having appeared, then mercurials ought not to be prescribed, inasmuch as they will not then produce these effects upon the salivary apparatus, but increase the debility and irritability of the patient, and accelerate disorganisation.

177. Where much *disorder of the bowels* exists or appears in the course of the disease, calomel, or even the mildest preparations of mercury, as the hydrargyrum cum cretâ, &c., should be given with great caution; and, where it is clearly indicated, it should be combined with opium, ipecacuanha, &c. And, in order to protect the mucous surface of the large intestines from the irritation of the morbid secretions passing over them, emollient enemata ought to be administered.

178. When calomel has been given as above stated, its operation upon the secretions, excretions, and system in general, will be induced with a celerity in proportion to the extent to which vascular depletion has been pushed. But, in many cases, the symptoms disappear so quickly after blood-letting, as not to require the further exhibition of calomel at bed-time. When this is the case, and the patient is recovering rapidly, the secretions and excretions having assumed a healthy appearance, there is no further need of mercurials, although their specific effects may not have at all appeared. If they have taken place, the circumstance may be viewed as favourable; but to continue them after the secretions are healthy and the symptoms of the disease have subsided, is most mischievous, by exhausting vital power, and by over-exciting or otherwise disordering the biliary organs.

179. If, after the means above advised have been employed, the secretions and stools continue still

morbid; if any disorder can be detected in the seat of the liver or in the abdomen; if the tongue be loaded or furred; and the countenance be sallow or unhealthy — the speedy induction of ptyalism will then be often judicious and beneficial. If, however, this effect be not produced in the course of four or five days, it will be detrimental to make the attempt for a longer period. The means by which the mercurial action may be speedily induced are various; but mercurial inunction, thrice daily with mercurial ointment conjoined with camphor, the patient continuing the full dose of calomel at bed-time with James's powder, or ipecacuanha and opium, is most to be relied upon. Combining calomel with any of the preparations of antimony tends to hasten the specific effects of the former, particularly after blood-letting. If irritation of the large bowels supervene, emollient enemata should be administered; and a cooling aperient may be taken occasionally, to evacuate the morbid biliary and intestinal secretions which rapidly accumulate in hepatic diseases, and which, if not removed from the bowels, irritate, inflame, and ulcerate the parts in which they lodge. As soon as ptyalism is produced mercurials should be intermitted, and gentle tonics, refrigerants, and alkaline carbonates, saline aperients, and a light abstemious diet should be prescribed. It is not necessary, in hepatic diseases, to continue this effect upon the salivary apparatus above a few days; for its influence upon the complaint is produced in a short time.

180. In the sub-acute and less active cases, particularly those which have been of somewhat long standing, or which have supervened on previous disorder of the liver, deobstruent and saline aperients alternated with mild mercurials and alteratives, and occasionally with a full dose of calomel at bed-time, is generally beneficial, particularly after local depletions have been duly prescribed. If these means fail, then the full effects of mercury should be induced as quickly as possible; after the appearance of which mercurial medicines may be laid aside, at least for a time.

181. When great congestion and enlargement of the liver accompany the inflammatory state, repeated leeching, or cupping under the scapula, and de-obstruent and chologogue aperients, are requisite. After the inflammatory action is entirely removed, blisters, applied to the region of the liver, are generally useful; and, in the more chronic or obstinate cases, the blister should be kept open, or an issue made in the side. Laxatives and aperients act more copiously after vascular depletion, and blisters applied on the region of the liver promote the secretion and excretion of bile. In all instances the evacuations should be inspected by the physician, as they furnish the chief part of the information required as to the state of the disease and the effects of remedies. The patient's or the nurse's account of them ought never to be trusted.

182. If fulness, swelling, or congestion continue after inflammatory action is removed, and after deobstruent aperients have been duly employed, and if the disease thus assume a chronic form, the means hereafter to be recommended become appropriate. In this state of disease, I have prescribed small doses of the *iodide of potassium*, with *liquor potassæ* and *decoction of taraxacum*, and occasionally the spirits of nitric ether with marked advantage. A liniment rubbed on the region of the liver, or an embrocation, or deobstruent plaster, in this situation, is also of service.

183. After the acute symptoms have yielded, and the digestive functions appear restored, still much torpor of the liver often continues, and a course of gentle laxatives and deobstruents, combined with bitters and mild tonics, is often required, in order to assist the vital action of the organ, and to excite the sluggish bowels. If any enlargement still exist in these cases, either the deobstruents just mentioned, or small doses of PLUMMER's pill, or of blue pill, should be given at night, and weak solutions of salts in the morning. But care should be taken to detect any remains or return of inflammatory action, and to remove it by local depletions and cooling diaphoretics. In many of these cases, the treatment advised for chronic hepatitis is appropriate, particularly the *nitro-hydrochloric acid* bath or lotion, and the *nitric* and *hydro-chloric acids*, or either of them singly, taken in any of the simple beverages used by the patient. When torpor of the liver remains after acute hepatitis, a course of these acids promotes the re-establishment of the biliary secretion and the return of strength, particularly when conjoined with mild tonics and a suitable regimen.

184. *D. Treatment of the Complication of acute Hepatitis.* — These complications chiefly result from the neglect of treatment of the primary disease, or of the early stage of the disease, and more especially from the neglect of blood-letting. — *a*. When the concave or posterior part of the liver is inflamed, the extension of disease to the *stomach*, *gall-bladder*, or *ducts*, is often rapid, particularly in warm climates, if an appropriate treatment be not promptly employed. In this complication general and local depletions and full or large doses of calomel, with or without opium, are especially requisite; and from having recourse to these, the state of the pulse and feelings of the patient should not deter the physician, as the symptoms will all improve after resorting to them. Subsequently, external derivation, the semicupium, or pediluvium, &c., may be prescribed. Irritating purgatives should not be given by the mouth; but the action of the bowels should be procured by means of purgative enemata. The treatment of this complication is, however, not different in any respect from that of the simple disease; it requires only to be more energetic and more promptly resorted to.

185. *b. Diaphragmitis, pleuritis, pneumonia*, or even *pericarditis* is not infrequently associated with acute hepatitis, particularly when the convex surface of the liver is affected; and it is sometimes difficult to determine, especially when the patient comes under treatment late in the disease, which of these was the primary affection. In some cases, disease commences in the form of pleuritis and extends to the diaphragm or liver or both; but more frequently it attacks first the superior surface of the liver, and subsequently the diaphragm, the pleura, and lastly the lungs, or more rarely the pericardium. The respiration, expectoration, and physical signs will indicate the presence of one or more of these complications, of which *diaphragmitis* is the most frequent, as respects the affection of either of its serous surfaces, although it is not

that which is most frequently detected during life. (See art. DIAPHRAGM, §§ 8, *et seq.*) — In some cases, however, the liver rises, in consequence of the congestion and swelling attending inflammation of it, so high in the right thoracic cavity, as to simulate either simple pleuritis, or pneumonia, or the complication of hepatitis with these. When hepatitis is neglected, or inactively treated, extension of the disease to the diaphragm, thoracic membranes, and lungs, is of frequent occurrence, both in warm and in temperate climates. In these complications, active depletions, and the antiphlogistic treatment and regimen in all their details, are required. In order to aid in lowering vascular action, and to prevent, or to remove, the consequences of inflammation, full doses of calomel with James's powder, with or without opiates or anodynes, according to the circumstances of the case, should be prescribed. Antimonials ought never to be omitted whenever there is reason to suppose that disease exists in the thorax, or is advancing thence from the liver. They may be given so as to occasion some degree of nausea; but it is doubtful whether or not they should be prescribed so as to produce full vomiting when the liver is unequivocally inflamed; for, although vomiting may relieve the affection of the lungs, it may aggravate that of the liver. In some cases, good has indirectly resulted from the exhibition of an emetic, in developing and rendering more manifest an obscure disease, and thereby leading to a more energetic and suitable treatment, than would otherwise have been employed. Where inflammatory action is subdued, these blisters, rubefacients, or the tartarised ointment may be applied; and if the case become chronic, a seton or issue may be made in the side. In this complicated state of disease mercurial medicines should be given in combination with antimony, camphor, or opium, or with either or all, according to circumstances. If no effusion has taken place into the thoracic cavity, vascular depletions having been duly employed, benefit will be derived from a warm terebinthinate embrocation applied over the seat of uneasiness; but if effusion have taken place, the repeated application of blisters, persistence in the use of mercurials until the mouth is slightly affected, and the continuance of this affection by means of the milder preparations every night, whilst small doses of the hydriodate of potash are given in the course of the day with the liquor potassæ, will generally remove the disease, if extensive disorganisation have not taken place.

186. *E. Treatment of Abscess of the Liver.*—When the symptoms noticed above (§§. 131, *et seq.*) indicate commencing or even impending suppuration, then mercurials ought not to be prescribed; for they will only lower the vital powers, and extend the local disorganisation. Moreover it has been shown by MARSHALL, MALCOLMSON, GRAVES, STOKES, and others, that it is impossible to affect the salivary glands with mercury when an abscess has once formed; and I have long ago insisted that it is also difficult to produce this effect whilst acute inflammatory action exists, or is unsubdued. Although matter may be actually forming, the inflammation producing it does not cease upon this event. Suppuration in parenchymatous structures especially is a consequence, but not a termination, of inflammation. In some cases, inflammatory action continues with much activity until the abscess makes its way either externally or into some viscus or cavity; whilst in others it subsides considerably, the circulation exhibiting merely the irritable state, and the hectic symptoms usually attending the formation or the existence of matter in vital organs. When, therefore, it is inferred that an abscess is formed, it is necessary to control, as much as possible, the state of vascular action, locally and generally, particularly where we find, from the existence of pain, excited state of the tongue, and character of the pulse, that inflammatory action is considerable. In these cases, small or repeated local depletions, cooling diaphoretics, and a refrigerant and febrifuge regimen, are the most appropriate means. By these the morbid action should be diminished, whilst vital power is preserved by attention to air and diet. Whilst depleting locally and prescribing aperients in order to evacuate morbid secretions and fæcal accumulations, which always increase disorder when allowed to remain, the physician will often see the necessity, in these cases, of supporting the vital functions by a gently nutritious and cooling diet, allowing the patient no more food than the digestive organs can properly dispose of. When these functions fail he will endeavour to rally them by gentle tonics conjoined with refrigerants, as the nitrate of potass, the hydrochlorate of ammonia, or the mineral acids; knowing well, that, if these functions are allowed to sink in the struggle they have to endure against the organic changes going on in the liver, the purulent formation becomes the more extensive and formidable.

187. *a.* When there are general tumefaction and throbbing in the region of the liver, with pain, firmness of pulse, and erethismal appearance of the tongue,—but without either rigors, cold sweats, faintings, or a sense of sinking, anxiety at the scrobiculus cordis, or night perspirations, then local depletions may still be freely employed; but the amount of such depletions should depend upon the strength of the patient, his age, and on what has previously been done. In this state it is generally too late to have recourse to mercurials, excepting as aperients. They will merely add irritability to an irritable pulse, and lower vital power. In general, the abscess which is forming has not yet materially deteriorated the circulating fluids; and leeches applied over the seat of swelling, and followed by a succession of warm poultices, may tend both to lower the local action and to favour the extension of the matter to the surface.

188. When formications, rigors, cold, or profuse sweats, a sense of sinking, and other signs of change in the circulating fluids, and of vital depression are present, even local depletions will then be injurious, and mercurials not less so. But the nitro-hydrochloric acid, or the nitric acid, taken frequently, or in the patient's usual drink, is often grateful and restorative, especially if it does not disorder the bowels. If it have this latter effect the tincture of opium should be used along with it. Either of these acids may also be taken in gentle tonic infusions. When it becomes still more necessary to support the powers of the system, the sulphate of quinine with sulphuric acid, the infusion, decoction, or other preparations of cinchona, with chloric acid, or chlorate of potash, or with liquor potassæ, or the alkaline carbonates, may be severally prescribed.

189. As an hepatic abscess advances externally the diffuse swelling is gradually changed to a distinct tumour, which generally becomes softest at its apex or most prominent part. The tumour is attended by an expanded and firm base. If adhesions have formed between the inflamed surface of the liver and the abdominal parietes, the most prominent part of the swelling is soon after somewhat red and hot. When an abscess forms in the concave part of the liver, although much general swelling is evident in the region of the organ, yet a distinct tumour is rarely detected, unless the abscess be seated in or near the anterior edge of the viscus. When the symptoms indicate the existence of abscess, in connection with prominent disorder of an adjoining viscus, no distinct tumour appearing externally, it may be concluded that the abscess is making its way towards or into that viscus. In most of such cases little more can be done than to support the powers of life, without exciting vascular action, and to evacuate morbid secretions.

190. *b.* If the abscess point upon, or adhere to, the diaphragm, dyspnœa, thoracic oppression, anxiety at the præcordia, cough, hiccup, or a suffocating sensation, are generally present, and require the exhibition of anodynes, antispasmodics, and aperients. If pain be complained of and the pulse has not become weak or irritable, a few leeches may be applied in the direction of the diaphragm, or over the sternum. If the abscess open into the bronchi, after adhesions have formed between the several serous surfaces intervening, the chief intentions are to palliate the several thoracic symptoms, and to support the strength of the patient. If adhesion of the pleural surface does not take place, the abscess may break into the thoracic cavity, and give rise to all the phenomena of *Empyema.* (See PLEURA.) Where an abscess of the liver finds its way to the bronchi, the sudden irruption of the matter is often attended by signs of impending suffocation. In order to relieve this, the patient ought to be raised up, and warm fomentations should be applied to the chest and region of the liver. When the abscess has burst in this situation, benefit will sometimes be derived from nitric acid solution conjoined with laudanum, hyoscyamus, or conium. When the tongue is moist, the expectoration easy, copious, and purulent, and the patient does not complain of much pain, the pulse being devoid of hardness or sharpness, the infusion, or even the decoction of cinchona, may be tried, with an acid and narcotic, the bowels being duly regulated and evacuated. If night perspirations, with loss of strength and appetite, or with other signs of exhaustion supervene, the same means, in still more efficient forms, or the mistura ferri composita, may be prescribed. Where it is requisite to exhibit an aperient in these cases, the decoctum aloës compositum with the spirit. ammon. arom., or the compound infusion of gentian and senna, are the most appropriate.

191. *c.* If abscess of the liver is apparently pointing upon the stomach, as indicated by some difficulty in swallowing, by great thirst, by vomiting soon after substances are taken into the stomach, or by general irritability of this organ, or a pumping up of its contents, sometimes by jaundice, and by the sitting or semi-recumbent position of the patient, little can be done beyond palliating the more urgent symptoms. Large or full doses of opium may be given; and the mineral acids may be taken in the patient's beverage. The compound infusion of roses, or the infusion of calumba, may likewise be tried with laudanum, or with other narcotics. Hydrocyanic acid and creasote may also be employed. In one case, I prescribed the creasote with opium with temporary relief. The bowels should be evacuated chiefly by enemata. When the abscess pointing on the stomach is large, considerable tumefaction is observed in the region of the liver; and when it makes its way into the stomach, death generally follows immediately afterwards. In a case to which I was lately called into Montgomeryshire, this occurred; the swelling and bulging of the right hypochondrium and epigastrium being remarkable, in addition to the other symptoms, and to deep jaundice. When the abscess is smaller, death is less immediate.

192. *d.* If the symptoms indicate that hepatic abscess has opened into the large bowels, the indications are to palliate the urgent symptoms and to support vital power. In some cases, the abscess actually opens in this situation, without the event being detected; the occurrence being mistaken for the frequent complication of chronic diarrhœa, or dysentery, with inflammation of the substance of the liver. When, however, the abscess is large, the change observable in the hepatic regions, and the state of the evacuations, often indicate the occurrence. In these cases, the chief intentions are, to support the strength of the patient, to soothe the irritation in the bowels, and protect their internal surface, by administrating emollient and demulcent enemata. The warm bath, hot or rubefacient embrocations applied over the abdomen, and the nitric acid or nitro-hydrochloric acid, in demulcent and gently tonic vehicles, with laudanum, or with the compound tincture of camphor, &c. are also sometimes beneficial. In these cases, the abscess may refill, and open again in the same or in another part of the bowel, most commonly in the former; and although death follows in the great majority of cases, recovery sometimes takes place.

193. *e.* It is not improbable, that one or more abscesses may form in the substance of the liver, and that, after having increased to a certain extent, or remained stationary for a considerable period, they may either partially * or altogether be absorbed, without opening either externally, or into any other part, and the patient entirely recover. Proofs of this occurrence have been furnished by the history of cases, and by post mortem examinations, where the liver has presented extensive cicatrices, or marks of the seat of old abscesses, from which the matter had been absorbed, and the internal surfaces had adhered, as described in another section (§§ 212, 213.).

194. This favourable result occurs chiefly when the powers of the constitution are not allowed to sink, and when the absorbed matter is freely eliminated by the kidneys, before it accumulates in, or contaminates, the blood so as to give rise to the

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* It is not unlikely, also, that certain deposits assuming a semi-consistent or cheese-like appearance, and varying from one to several in number, occasionally found in the liver, particularly in Europeans who have resided long in the East Indies, are merely the more consistent and albuminous parts of pus, the aqueous portions of which had been absorbed.

severer forms of hectic, and all its consequences. It is very probable that the chronic diarrhœa and dysentery attending abscess of the liver are owing to the effect produced upon the glandular apparatus, and on the villous surface, of the intestines, by the purulent matter absorbed into the circulation, particularly when it is not sufficiently eliminated by the kidneys.

195. *f.* The *diet* and *regimen* of the patient should be carefully attended to, and should be so regulated, during the course of hepatic abscess, as not to excite or increase febrile action, or to impair the powers of life. The farinaceous kinds of food taken in sufficient quantity for the wants of the system and powers of digestion, as tapioca, arrow-root, sago, rice, rice-milk, bread and milk, bread-puddings, stale bread, biscuits, jellies, &c., are generally most appropriate, although cases occur in which other articles of diet, according as they are relished, digested, or agree with the patient, may be permitted. When animal food is allowed either to support the system, or during convalescence, the lightest kinds of fish and white meats should be preferred, and taken in small quantity.

196. *g. The external opening of hepatic abscesses*, and the best modes of accomplishing this end, have engaged the attention of several writers, and very discordant testimony has been furnished by them of the success of the operation. There are numerous circumstances which influence the results of these cases: — 1st. The age, diathesis, and constitutional powers of the person: — 2d. The size and pathological associations of the abscess: — 3d. The existence of two or more abscesses: — 4th. The situation, particularly as respects the more external part of the organ: — 5th. The existence or non-existence of adhesions between the surface of the liver and the abdominal parietes: — 6th. Redness and prominence over the seat of the abscess: — and 7th. The states of severe or advanced hectic and protracted diarrhœa, or chronic dysentery. Of these more important circumstances, external redness and prominence over the seat of abscess, as indicating the existence of adhesions and a somewhat external or superficial position of the purulent collection, and sufficient constitutional power to bear the more immediate and the contingent effects of the operation, are the chief indications for entering upon it. Mr. BELL states that Dr. DICK, a physician of extensive experience in the diseases of India, found that the application of caustic to the part at which an abscess is pointing externally, with a view of opening it gradually, is sometimes followed by absorption of its contents, and by the recovery of the patient. This being the case, he was led to consider severe external irritation, over the seat of the abscess, as a most efficacious mode of favouring the absorption of the contained matter; and to recommend the application of caustic as the best means of procuring its external discharge. Dr. GRAVES advises an incision to be made through the integuments over the most prominent part of the external swelling, dividing the more superficial muscles, and keeping the wound open by a plug of lint. Mr. ANNESLEY recommends the operation only when external redness with some degree of pointing, indicates the adhesion of the surface of the abscess to the abdominal parietes, and prefers the lancet to the trocar in performing it. He objects to the latter on account of large flakes or curd-like matters being contained in some abscesses, which cannot pass through the canula, but are retained whilst the more fluid parts only pass away. Having made the external excision large and with caution, until the peritoneum is exposed, fluctuation will be felt. An abscess lancet should then be introduced, and the abscess opened to the full extent of the external incision, which ought to be from two-and-a-half to three inches in length. Care ought always to be taken that the opening do not extend beyond the limits of the adhesions which have been formed. Being fully evacuated, the cavity is directed to be filled with lint, in order to give a mechanical support to the excavated parts, and the wound to be dressed with compresses and bandages in the usual way.

197. Of these several modes of procuring the external discharge of hepatic abscess, that advised by Dr. DICK, when aided by appropriate internal and constitutional treatment, is evidently that which is most congruous with pathological conditions, and with an enlightened experience. To fill the cavity of the abscess with lint, as Mr. ANNESLEY advises, is merely to admit the air, and to promote a more copious secretion of pus from the internal surface of the abscess: it cannot aid granulation and contraction of the cavity, but will increase the discharge, aggravate the hectic symptoms, and sink the patient with greater rapidity, as in all other cases where large internal abscesses have a free external opening, permitting the action of the air. In hospitals, and in low, damp, crowded, or miasmatous situations, this mode of procedure is particularly dangerous. I believe that, in whatever way the abscess may be opened, the orifice should be completely shut after the matter is discharged, so as completely to exclude the air, even although it may be necessary to reopen it oftener than once, when matter re-collects. After the abscess has been opened, it is necessary to attend to the diet and regimen of the patient, to support the constitutional powers by means of mild tonics, or tonics conjoined with refrigerants, and to promote and correct the secretions and excretions by alteratives and restoratives.

198. *F. Treatment of Chronic Hepatitis.* — *a.* I have shown above that the chronic states of hepatitis are often similar to the acute, and differ chiefly in the activity or duration of the disease, in the structure chiefly affected, and in the more frequent association of organic lesions with the former than with the latter. The nature, however, of these lesions is seldom manifested through life, unless in as far as they may be attended with enlargement of the organ, and with deficiency of bile, or with jaundice; and even these are often equivocal. Although the bile is generally in smaller quantity, more remarkably changed from its healthy characters, and more frequently obstructed where the internal structure of the liver is chronically inflamed than when the surfaces are the seat of acute disease, yet the exceptions to this are so numerous as to forbid great reliance being placed upon it as a basis for indications of cure. The circumstances of chronic hepatitis being generally the cause of a great majority of the lesions of structure found in the liver, and of itself being as frequently a sequela of the acute disease as a primary affection, ought to be kept in recollection, in determining the treatment

that should be pursued. The forms of chronic hepatitis which are most readily recognised, and are most commonly treated as such, are those which are characterised by enlargement, by a scanty and depraved state of the bile, dyspepsia, and general ill health, low spirits, a sallow countenance and emaciation, particularly when they follow the acute disease, or periodic fevers, and occur in warm climates. In these cases, the treatment should depend upon the previous disease, upon the antecedent treatment, and upon the duration of a residence in a warm climate. If much mercury has been already prescribed, if the constitutional powers are much reduced, mercurials, vascular depletions, and drastic purgatives, are inappropriate, and recourse ought to be had to the *nitro-hydrochloric acid bath*, which should be steadily persisted in for a month or six weeks. Whilst it is being employed, or previous to a course of it, a vapour or warm bath should be taken two or three times, and followed by friction of the general surface; but the occasional recourse to the vapour or warm bath is preferable. At the same time two or three drops of these acids may be taken in the patient's usual drink, and deobstruents with mild aperients may be prescribed. It is in this form of the malady that the nitro-hydrochloric acid bath or lotion is the most beneficial; and in it the chlorides, the nitric acid, the tartrate, supertart., and acetate of potass, are also beneficial. In the more chronic and obstinate states of the disease, I have found small doses of the iodide of potassium, conjoined with liquor potassæ and with the decoction and extract of taraxacum, of great service.

199. *b.* When chronic hepatitis is a recent or primary affection, or follows the acute disease owing to neglect or inactive treatment, or when it occurs in persons who live fully or who have not been reduced by previous disease, or by long residence in an unhealthy climate, then local vascular depletions, deobstruent and active purgatives, and mercurials, are especially indicated. If this state of the disease be attended by congestion or enlargement of the organ, local depletions may be freely prescribed, and saline or other purgatives often repeated; but mercurials should, in most forms of chronic hepatitis, be given with caution. They are most beneficial in this particular state of the disease, where, however, they should be employed chiefly as deobstruent purgatives. In other circumstances, experience has not demonstrated their utility, but shown that a frequent recourse to them only perpetuates the mischief, for which they were employed. This seems to be the opinion of Clark, Dick, Saunders, Pemberton, Malcolmson, Martin, and others; and it accords with my own observation.

200. *c.* The *nitro-hydrochloric acid bath* was first recommended by Dr. Helenus Scott, who afterwards ascertained that sponging the surface with a wash, containing the same acids, was as efficacious as the bath. Since 1796, when Dr. Scott published his first paper upon this subject, Sir James M'Grigor, Dr. Pemberton, Mr. Bell, Mr. Annesley, Mr. Martin, and many others, have shown the great efficacy of this treatment in chronic hepatitis; and, after all the acute symptoms have been removed, in cases of the more active states of the disease. It is more especially beneficial in cases attended by enlargement of the viscus, and a depraved state of the biliary and intestinal secretions. It should be employed daily for some time; and a trial of from two or three to five or six weeks may be given it, according to its effects. Even after its use has been intermitted for some time, its good effects will often continue to appear. In obstinate cases, advantage from it should not be despaired of, although weeks may elapse without benefit being derived from it; and, although the first course of it may have been ineffectual, a second trial may be decidedly beneficial. A short time should elapse between the use of mercurials and a recourse to this bath, or wash*; and purgatives should be occasionally given during the course, in order to carry off accumulated secretions from the liver and intestines. If heaviness or drowsiness occur after this treatment has been pursued for a few days, purgatives may be more actively prescribed. During the nitro-hydrochloric course, a change of air, especially to a temperate or cool and pure atmosphere, will be of service. A feeling of cold, however, should not be occasioned by the change, as some risk of aggravating the complaint may be thereby occasioned. Sea voyaging, particularly when medical care may be enjoyed at the same time, is often of service, especially after the patient has resided long in a warm climate. In all cases of change from a warm to a colder temperature, the clothing ought to receive due attention, and the night air should be avoided or guarded against.

201. The *nitrous acid* has been employed, in a very dilute state, as a common drink in chronic hepatic affections, in warm climates, chiefly as an alterative, and in order to promote the secretion and excretion of bile. When taken freely, and continued for a few days, it sometimes occasions salivation; but it is often of service without producing this effect. Sir J. M'Grigor considered it equal to mercury in the cure of hepatitis: in the chronic states of the disease it is certainly a safer remedy than mercury, which ought not

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* Mr. Annesley gives the following directions as to the preparation of the nitro-hydrochloric solution, lotion, wash, or bath: — "Into a common quart bottle, put about eight ounces of pure water, to which add four ounces of the nitric acid, and four of the hydrochloric acid, of the strength of the London Pharmacopœia. The '*nitro-hydrochloric solution*' is thus formed. If it is used in the form of a bath, from two to five ounces of it, according to the strength of the patient, is mixed with from two and a half to three gallons of warm water, of 96° or 98°, in a high and narrow vessel, and the feet and legs kept immersed in it for about twenty minutes or half an hour every night before retiring to rest. If the bath does not occasion a pricking or itching sensation in the parts immersed, after twenty minutes have elapsed, the next bath should be increased in strength." Mr. A., however, states that, upon the whole, he prefers sponging the trunk of the body, and particularly the abdomen, with the nitro-hydrochloric lotion or wash; which consists of two or three drachms of the above solution added to a pint of warm water. With this wash, he advises the trunk of the body and the insides of the thighs to be sponged assiduously, for about a quarter of an hour daily, or occasionally night and morning. In torpor, and other chronic affections of the liver, he recommends this wash to be used; also in the form of *fomentation*, or to be aided by the application of warm poultices. "Occasionally much benefit will arise," he observes, "from employing the lotion in the form of fomentation; the water being made as hot as 130° or 140° when the acid solution is added." Flannels soaked with the lotion may be applied for an hour or two every night over the hypochondria and abdomen; and they may be covered with warm poultices, both the moistened cloths and the poultices being renewed from time to time.

to be employed when this acid or the nitro-hydrochloric acids are being used. — *Issues, setons*, or open *blisters*, or even the repeated application of blisters, a little below or over the region of the liver, are often beneficial in the more protracted cases, and when the foregoing means have proved unavailing. After a discharge from them has been established, poultices applied directly over them, and frequently renewed, are sometimes of service. *Vapour baths*, followed by frictions with a coarse towel, or by the flesh-brush, or hair gloves, and *chlorine baths*, are occasionally serviceable, and may be employed in the obstinate cases, in aid of deobstruents, alteratives, and aperients. Of other means notice will be taken in the sequel, and after I have exhibited a view of the more chronic structural lesions of the organ.

202. IV. STRUCTURAL CHANGES IN THE LIVER. —CLASSIF.: — IV. CLASS. I. ORDER (*Author*). These changes are divisible into *two classes*, viz. those which proceed from excited vascular action, or are *inflammatory*, and those which depend upon the state of organic nervous power and nutrition, or are *non-inflammatory*. The former are generally more or less acute or active at their commencement, or are the consequences of acute or sub-acute disease: the latter are always chronic. Although both classes of lesions may originate in alterations of the organic nervous or vital condition of the liver, affecting the circulation and blood, and ultimately the structures of the organ, yet they depend upon very different states of the parts primarily affected; for whilst the one class seems to arise from an excited or exalted state of local nervous power and vascular action, the other apparently proceeds from a depressed as well as depraved condition — from very opposite states of power and of action; although the former may pass into the latter, when neglected, or in circumstances favouring the transition. *Congestions* of the organ, which may be independent of, or connected with, either of these classes of lesions — both *vascular* and *biliary congestions* — have already been sufficiently noticed above, (§§ 59, *et seq.*), and need not therefore be again adverted to at this place.

203. i. *Changes more strictly inflammatory, and consequent upon inflammations.* — *A.* The *serous membrane* or covering of the liver is liable to the same changes as are observed in other serous membranes. These are chiefly distension or development of the capillary vessels, effusion of lymph from the free surface of the part, and adhesion by means of this lymph to contiguous surfaces. The lymph thrown out upon the inflamed surface generally excites inflammatory irritation in the opposite surface, when brought in contact with it; and new capillary vessels are developed from the meshes of the old, and shoot into the coagulable lymph and organise it. The membrane itself becomes slightly thickened, softened, and less tenacious than natural. These changes are common on the convex surface of the organ, are less frequent upon the concave surface, and are generally observed after acute or sub-acute hepatitis affecting chiefly the surface of the organ, or membranous hepatitis. In these cases, congestion of the substance of the liver, and sometimes inflammatory appearances of the part subjacent to that chiefly affected, are also observed. In old or chronic cases, the serous membrane is often thickened, opaque, and dense. It is sometimes also more readily torn, or less resistent. Depositions are also formed underneath this membrane, in the chronic forms of inflammation of it. They consist of thin plates, presenting a cartilaginous appearance, and of an atheromatous substance.

204. *B. The substance or parenchyma of the liver*, (*a.*) when *inflamed*, is more or less reddened, often deeply red, congested, and softened. If the inflammation is general, there is also great tumefaction from vascular distension. It is seldom, however, that the earlier changes connected with acute or chronic inflammation of the liver are observed, as the consequences and complications of the disease chiefly cause death. These early changes may occur in a part of, or more or less extensively throughout, the organ. They may exist alone, or be associated with inflammatory appearances in the serous surface, or with more advanced or other lesions.

205. (*b.*) *Softening of the structure* of the organ is various in degree, and is commonly caused by the more acute states of inflammation, although it may also proceed from other causes. When produced by inflammation there is not only friability but also redness more or less deep. In some places the redness is lessened by a sero-puriform or a puriform infiltration between the minute lobules. In these, abscess would most likely have been more fully developed, had the patient lived longer. In other cases the softening has proceeded still further in the centre, or in various parts of the inflamed tissue. In some instances, particularly in warm climates, the softened part is of a deep or dark colour, owing to associated vascular and biliary congestion (see CONGESTION OF, § 73.). The most remarkable grade of softening is that which is sometimes observed after death from the more adynamic or malignant forms of remittent or marsh fever, and from scurvy. In these the softening is not the result of inflammation, but of depressed vital power, causing extreme congestion with alteration of the congested blood. The congestion is sometimes so great in these cases, the blood so dark, and the tissues of the organ so softened or so much deprived of its vital cohesion, that the viscus assumes the appearance of a black, friable, or pulpy mass, which readily breaks when it is handled. Softening of the liver is often conjoined with tumefaction or enlargement, although not necessarily. Dr. BAILLIE has noticed softening of this organ in aged persons, the consistence of it approaching that of the spleen, and its colour being of a brownish red. Still more extreme states of softening have been observed by PORTAL, BALLY, JACKSON, DEVÉZE, MONTFALCON, BAILLY, myself, and many others, in fatal cases of malignant remittent and other fevers, of scurvy, and of purpura. In these the organ had hardly retained its form by means of the cellular framework of GLISSON's capsule and of its vessels.

206. (*c.*) *Suppuration and abscess* often follow softening of a portion or parts of the substance of the liver. Indeed, the softening may generally be viewed as the antecedent of suppuration, the sero-puriform matter effused from the capillaries of the part breaking down or dissolving the vital cohesion of it, especially at its centre. If the

constitutional powers be not sunk, and if the blood be not contaminated, lymph is effused around the central softened and infiltrated part, and this lymph, as the infiltration and effusion in the centre proceeds, forms a cyst inclosing the matter secreted from its internal surface. (See art. Abscess, §§ 5, *et seq.*). If, however, the powers of life and state of the circulating fluids are such as not to form coagulable lymph, which may be thus condensed and stretched into a cyst by the matter accumulating within it, the abscess assumes a *diffuse* character, is not surrounded by any distinct cyst, the purulent matter at the margins of the collection infiltrating the surrounding lobules or structure of the organ. (See art. Abscess, §§ 13, *et seq.*)

207. *Abscess* of the liver may hence be divided into the *encysted* and *non-encysted*, either of which may be large and single, or numerous and small; or one large and several small may exist in the same organ; but it is very rare to find both the encysted and non-encysted in the same viscus. Abscesses frequently proceed from acute, and less frequently from chronic inflammation. They are much more frequently consequences of chronic or sub-acute inflammation in scrofulous persons.— *α*. Abscess, particularly when single and contained in a cyst, often attains a very great size, and converts the whole of the right lobe into a vast sac, stretching and condensing, and ultimately atrophying or destroying, the lobular structure of the organ around it, rising high in the right thorax, and bulging the hepatic regions. The cyst may be thin or thick, or more or less manifestly organised, and capable of containing from a few ounces to several pints. Louis and Andral consider that the internal surface of the cyst is analogous to mucous membrane.

208. *β*. The *non-encysted* kinds of abscess are rarely very large, although I have seen them very large in one case, and others have been observed by Mr Annesley. They are rarely single, several or even many existing in the same case. They are either in immediate contact with the structure of the organ or partially infiltrating or diffused among the surrounding lobules. In many of these cases, little or no inflammatory appearances exist in the adjoining substance of the organ, whilst in others these appearances are either slight or equivocal, or are merely those of congestion. These abscesses are owing chiefly to phlebitis, or to the passage of puriform matter into the portal circulation, that is either deposited in the part, or excites inflammation in the minute capillaries of the secreting structure. They have been also attributed, as noticed above (§§ 20. 152, 153.), to inflammatory action propagated along the hepatic ducts, according to some; and along the mesenteric and portal veins from the intestines, according to others.

209. The researches of M. Cruveilhier (*Nouv. Biblioth. Med.* t. iv. *et Anat. Pathol.* liv. xi.), however, have thrown much light upon the formation of these abscesses, which I have denominated *consecutive* or *secondary* (See art. Abscess, § 27.). He ascertained that abscess of the liver from injuries, fractures, wounds, and surgical operations, is always preceded or accompanied by purulent collections in the lungs, and always results from the same cause, namely, from capillary phlebitis in the neighbourhood of the injury or wound; the globules of pus, which thus pass into the circulation, occasioning inflammatory irritation in the capillaries of these organs in which the secondary suppuration is developed. When purulent or other morbid secretions are carried into the general circulation, the lungs, and frequently also the liver, become the seat of secondary abscesses, particularly when the powers of life are reduced, and the morbid matter is not excreted by the active functions of depurating organs. When these secretions pass into the blood of the portal system, consecutive abscesses or purulent collections generally take place in the liver. Hence, when ulceration occurs in the follicles or mucous surface of the bowels, in chronic diarrhœa and dysentery, capillary phlebitis in the vicinity of the ulcerated parts sometimes supervenes, and the pus being carried into the portal circulation, excites inflammatory action of the capillaries of various parts of the liver. In like manner, secondary abscesses in the liver follow, as noticed above (§ 20.), operations for hæmorrhoids, fistula in ano, abscess, or ulceration near the anus, uterus, &c.

210. The changes which take place in the liver in these cases are stated by M. Cruveilhier to be, in the first instance, effusion of bloody lymph and induration around the consecutively inflamed capillary vein; secondly, a secretion of yellow concrete pus into the minute veins, and among the lobules, giving the part a granite-like appearance; and thirdly, collections of pus, or small abscesses lodged in irregular cells, which increase in size by the continued secretion and extension into other cells. These purulent collections are surrounded by a narrow congested circle or margin, imparting to them a peculiar character. After they have existed a considerable time, their watery parts are absorbed, leaving concrete, whitish, and cheese-like masses, often resembling the matter of scrofulous tubercles.

211. (*d.*) *Gangrene* of the liver has been very rarely observed; and then chiefly in connection with *non-encysted* or *diffuse abscess*. I have seen only one instance of it; and it has likewise been noticed by Forestus, Steidele, Dr. Carsewell, and Mr. Annesley.

212. (*e*) *Enlargement or hypertrophy of the liver* is commonly consequent upon chronic inflammation, or upon the acute, after it has lapsed into the chronic state. It may be independent of any existing inflammation, and of vascular or biliary congestion, although either or all of these, in some grade or other, may have preceded, or may accompany it. The enlargement may be partial, or limited to any part or lobe of the organ, or it may be general. Mr. E. Wilson considers that it arises from irritation of the mucous membrane of the ducts, occasioning, in the first instance, retarded circulation and venous congestion; or from impediment either in the circulation through the heart, or through the rest of the venous system; or again from impairment of the general powers of the system, as in the scrofulous constitution. Without, however, disputing these sources of the lesion in some cases, I believe that it as frequently proceeds from an exudation of lymph between the minute lobules, or in the distributions of Glisson's capsule, that becomes more fine and dense, or more organised, the longer the period which has elapsed from its effusion; and that this lymph is the result of a sub-acute or chronic state of in-

flammatory action. Mr. E. WILSON states that the lobules are always in a state of partial congestion, resembling the second stage of hepatic venous congestion (§ 67.); the congested portion presents a deep red tint, and the uncongested part is ramose or convoluted in appearance, of a dirty white, greyish, yellowish, or greenish hue, according to the condition of the biliary ducts and apparatus, and to the quantity and colour of the bile contained in the liver. Sometimes the organ is pale, and seems deficient in blood; at other times it has a generally diffused redness, or the congestion may be greater in one part than in others. The *consistence* of an enlarged liver is equally variable with its colour: sometimes it is harder, firmer, or denser than common, and even apparently granulated; the uncongested and granulated or denser parts projecting occasionally above the surface, and the congested portion sinking below the level of the former. As frequently, however, the organ is more or less softened, although often partially or unequally so. The enlargement of the liver may take place to a very great extent, the organ weighing twenty, thirty, or even forty pounds; its enormous bulk displacing more or less the other abdominal viscera. Hypertrophy is often associated with lesions of other organs, particularly of the lungs, spleen, mesenteric glands, pancreas, &c.; and with other maladies, as scrofula, rickets, dropsical effusions, &c.

213. (*f*) *Induration* is occasionally attendant upon enlargement, and also upon atrophy, of the substance of the liver; but it sometimes is met with independently of these alterations, or with a normal size of the organ; the colour of the indurated portion varying with the grade of vascular or biliary congestion, from yellow to green, brown, or brownish red. The degree of density varies from a somewhat firmer state of the structure up to a cartilaginous condition. The highest grade of induration is generally observed in cases of atrophy. Occasionally the induration occurs in parts only of the organ, or is greater in some portions than in others. In rare instances it presents the distinct character of a fibrous or fibro-cartilaginous cicatrix, formed after the adhesion of the opposite sides of an abscess, the contents of which had been absorbed. The most hardened and granulated-like parts are also most deficient of blood.

214. (*g*) *Atrophy* of the substance of the liver is, like induration, one of the more remote consequences of inflammatory action. It may succeed congestion, or even hypertrophy; and, as shown by PORTAL, is a much more rare occurrence than enlargement. As the viscus diminishes in bulk, the lobules become indistinct and variously congested, and appear intermingled and pressed upon by the cellular tissue with which they are surrounded. Mr. E. WILSON says that the proper lobular structure is sometimes entirely removed, and replaced by a loose or condensed cellular tissue. At other times the entire substance of the organ appears to have been absorbed by the pressure of a very large abscess, which has discharged its contents into the intestinal canal, and the parietes have afterwards contracted into an atrophied mass. In rare cases, the atrophy is connected with a complete or incomplete cicatrix, remaining after *absorption* of the contents of an abscess, as noticed above (§ 213.). These cases have been detected chiefly in India. LIEUTAUD found a liver that was shrivelled into a mass not larger than his closed hand. PORTAL met with this viscus in a case of ascites, not larger than an ordinarily sized apple. Atrophy of the liver may be *general* or *partial*. The latter, conjoined with hepatic venous congestion, is not an infrequent consequence of the practice of tight lacing, as Mr. E. WILSON has justly observed. The surface of the liver, in some of these cases, is marked by deep fissures into irregular polygonal divisions, resembling the lobulated appearance of the fœtal kidney.

215. The *Cirrhosis* of LAENNEC is the most important form of atrophy of the liver. In it the organ is diminished to one half, or even one third, of its natural bulk; the relative size of the right and left lobes is destroyed; and the surface is rendered shapeless by the projection of a number of ridges or granular points. The entire organ is wrinkled and shrivelled, is of a yellowish or greenish colour, varying from a bright yellow to a yellowish or greenish brown. Upon dividing its substance, it is found denser than natural; and the divided surface presents a number of patches of various sizes, but of a roundish form, resembling granules; and hence this state has been denominated granular by French writers. This alteration has been variously described by LAENNEC, BOUILLAUD, ANDRAL, and CRUVEILHIER. Mr. E. WILSON remarks that Mr. KIERNAN first distinguished the true nature of cirrhosis, which he called atrophy of the liver. In a case of granulated cirrhosis, the liver being diminished to one half its natural size, Mr. KIERNAN discovered, on injecting it, " that a collateral venous circulation had been established by way of the diaphragm." In another case of a woman who had been tapped ninety times, he found, upon injecting the liver, that the same kind of collateral venous circulation had been formed. " The circulation through the liver had been impeded by the development of condensed cellular tissue; and the greater part of the blood of the portal vein had made its way through dilated vessels upon the surface of the organ to the diaphragm, and from thence into the general venous circulation. In the latter case there were numerous bands of adhesion between the liver and diaphragm, and between the intestines and the walls of the abdomen, and these also were traversed by large veins conveying blood from the portal vein into the general venous current."

216. M. LAENNEC believed that the mottled and granular appearance of a section of the liver in a state of cirrhosis arose from a morbid deposit, or from a special accidental tissue existing in the two states of crudity and softening. But somewhat more correct views were successively formed by BOUILLAUD, ANDRAL, and CRUVEILHIER, until Mr. KIERNAN demonstrated that cirrhosis is a partial atrophy of the liver — atrophy of the lobules with hypertrophy of the cellular tissue; complete atrophy of some of the lobules, partial atrophy of others, and biliary congestion without atrophy or hypertrophy of the rest. The small yellow grains, varying in size from a millet seed to a pea or hazel nut, are not distinct lobules, in a variable state of hypertrophy, but small uncongested patches, composed of parts of several ad-

joining lobules, and having a single or several interlobular spaces for a centre.

217. Cirrhosis may follow enlargement of the organ; and it is manifestly the more remote consequence of chronic inflammatory action or irritation, during which the coagulable lymph exuded into the cellular tissue connecting the lobules becomes organised, adds to the bulk and density of the cellular element of the organ, and thus hypertrophies it; the pressure thereby occasioned, together with imperfect nutrition of the lobules, producing more or less complete atrophy of them; whilst the varying states of vascular and biliary congestion, or of deficiency of blood and of bile in the vessels and ducts, occasion various tints of colour in different parts of the organ. When this lesion is far advanced, it produces ascites and jaundice, generally of that kind which proceeds from the accumulation of the elements of bile in the circulation. It is also sometimes preceded and attended by disease of the lungs or heart.

218. ii. *The second class of Lesions of the Liver, or those which seem more especially to depend upon impaired vital power and depravation of the blood sent to the organ,* differ from the foregoing in presenting no inflammatory character; in depending chiefly upon a constitutional vice, or proceeding from a diseased disposition inherent in the system; and in consisting chiefly of morbid deposits, and of malignant formations. As most of these have separate articles devoted to the consideration of their nature and treatment, a brief notice will therefore be taken of them as they appear in the liver.

219. *A. A deposit of fatty or oily matter* is not infrequently observed throughout the liver. A certain portion of oily or fatty matter is one of the chemical constituents of the liver; but this may be so greatly increased, appearing in different forms, in the substance of the organ, as to constitute more than one half of its weight. M. VAUQUELIN analysed a fatty liver which furnished 45 parts of oil out of 100 parts of the organ. This lesion is characterised by appearances resembling those exhibited by the livers of those fishes which furnish a large quantity of oil. The organ is of a cream or pale yellow colour, sometimes presenting deep orange or brownish spots on the surface. Internally its appearance is nearly the same as that of its surface. It is generally enlarged, and sometimes softened; but it is occasionally firmer or much harder than natural. The fatty matter is commonly distributed equally through its structure, or infiltrated in the connecting cellular tissue. Sometimes, however, it is deposited in a mass, or forms several collections in various parts of the organ. This change is readily recognised by the greasy feeling it occasions. A section of it appears like that of yellow soap. "The vessels seem pressed upon, and are scarcely perceptible; and the greasy deposit is divided into angular masses by a coarse and compressed cellular tissue." (E. WILSON.) The quantity of fat deposited in the organ is sometimes very great, and it may exist even in a fluid state.

220. PORTAL found the liver quite white, and softened almost to the fluidity of melted fat, where no hepatic symptoms existed during life. He also met with this state of the organ in a female suffering a severe form of syphilis. Fatty deposit in the liver is similar to other morbid deposits. The fat is not owing to a degeneration of the structure of the organ, but to an undue secretion or deposit of the oily substance into the cellular connecting tissue of the organ, whereby its vessels and lobules are pressed upon, atrophied, or removed, in proportion to the amount of deposit. This lesion is found most frequently in persons who have died of scrofulous tubercles in the lungs, and of cancerous maladies. It has also been observed in connection with hepatic and various chronic eruptions on the skin.

221. ANDRAL thinks that it may be owing to insufficient arterialisation of the blood in the lungs, and diminished pulmonary exhalation; and he inquires, if it can arise from an imperfect separation of hydrogen from the lungs, this element combining with the other element of fat, and being deposited in the parenchyma of the liver? This is not improbable, particularly during the low grades of vital power in which this change occurs, and in which nutrition is imperfectly accomplished.

222. *B. Deposits of true Tubercle* in the liver is rarely observed, and still more rarely independently of the presence of similar formations in the lungs, or other organs; or of general indications of the scrofulous diathesis. They are met with in the liver of various sizes, from that of a millet seed to that of a hazel nut. The tubercles are of a soft cheesy consistence, and have a tendency to a brownish tint. They are deposited or infiltrated, according to Mr. E. WILSON, in the tissue of the lobules, which are compressed and congested by them. The obstruction to the circulation in the organ occasioned by them gives rise to more or less congestion.

223. *C. Scirrhus, Carcinoma, or Cancer of the Liver,* appears in several forms; but most frequently in that of tubercles, tumours, or tubera of different size and consistence. They generally accompany manifestations of the malady in other parts of the body. At the commencement of their development in the liver, they resemble small, whitish, semi-opaque patches, occupying the tissue of one or several of the lobules. As they increase in size they put on different appearances, and hence they have been divided into species and varieties. — (*a*) The simplest of these has been termed *scirrhous tubercle*, and is well described by Mr. E. WILSON. It commences in a semi-opaque patch, and the outline of the lobules is for some time distinctly perceptible through its area; but at a later period the centre of the patch becomes quite opaque, and presents a cartilaginous hardness. The circumference is gradually diffused in the surrounding textures; and the progressive increase of the tumour seems to take place by the secretion of a milky albuminous fluid into the meshes of the lobular venous plexuses. As this secretion increases and becomes more consistent, the circulation in these plexuses is arrested, and the vessels obliterated. The obliterated vessels, according to Mr. WILSON, give rise to the appearance of small cells, in which the carcinomatous matter is deposited, and the larger areæ are produced by the tissue of the capsules of the lobules variously distorted from their original form by the increased deposition. As the tumours become larger, white lines, formed by compressed cellular tissue, radiate from the centre to the circumference. Upon the surface of the liver, the

scirrhous tubercle appears flat, or slightly depressed in the centre.

224. (*b*) In a *second variety*, these carcinomatoustubercles, or tubera, are small and numerous, of a yellowish or brownish colour, and more rapid in their growth than those just described. The cells in which the carcinomatous matter is contained seem thicker, of larger size, and the contained matter or secretion is less firm than in the above variety. Occasionally they are reddened in the centres by an effusion of blood, or by the congestion of unobliterated vessels, or by the passage of large or dilated nutritious vessels. When the latter variety of carcinomatous tubercles enlarge, they often coalesce, forming an irregular compound mass, divided into compartments, marking its original multiple form by septa of condensed GLISSON's capsule supporting dilated vessels. This form of tubercle or tumour appears to be identical with the first variety of the *tubera diffusa* of Dr. FARRE, and which he states to be "elevated at the surface of the organ, but not uniform in their figure, some rising with a regular swell into a round form, others acquiring a margin, by being gradually depressed towards the centre, forming tumours without cysts, almost pulpy in their consistence, cellular in their structure, and containing an opaque white fluid."

225. (*c*) A *third variety* of the albuminous carcinomatous tumours, the "large white tubercle" of BAILLIE, the "tubera circumscripta" of Dr. FARRE, is well described by the latter physician. These tumours are of a yellowish white colour, and their projecting surfaces, slightly variegated with red vessels, deviate from a regular swell by a peculiar indentation at or near their centres, which are perfectly white and opaque. They vary much in size, according to their age or duration; for each tuber at its commencement is very minute, but during its growth it assumes the above character, and at its maturity exceeds an inch in diameter. These tumours commonly are distinct at the surface of the liver; but they coalesce internally, and form immense masses pervading the substance of the organ. Their cellular structure is so close, that a section of them appears solid and inorganic; but a white fluid of the consistence of cream is left on the knife by which they are divided, and a fresh portion of this fluid adheres to it each time that it is passed over the surface of the section. The cellular structure becomes more apparent after long maceration.

226. (*d*) A *fourth variety* of carcinomatous tumour has been named the *gelatiniform cancer*, from the firm and jelly-like deposit occupying the cells of the tumour, instead of the albuminous secretion in the preceding varieties. The liver may contain a considerable number of tumours of various sizes dispersed through its substance. The smallest resemble the small patches in the incipient stage of the other forms of carcinoma already noticed. The largest are equal to a walnut in size. They are distinctly circumscribed, and the lobules immediately surrounding them are flattened and compressed. In the smaller tumours the form of the lobules is more or less distinct; but, in the larger, the lobules have yielded to the characters of the disease. On the surface, the centre of the tumour presents an oval or circularly indented ring, around which it swells abruptly, and then subsides to the circumference. In a section of one of the larger tumours Mr. E. WILSON found a central area about two lines in diameter, transparent, dense, gelatinous, and bounded by a white marginal line. The portion of the section surrounding the central area formed the bulk of the tumour, was elastic, and rose above the central area, subsiding gradually to the marginal line and circumference. The whole section bore a striking resemblance to the conjunctiva affected with chemosis, only that it was paler. On examining a thin section with a lens a number of minute parallel injected capillaries were seen traversing the marginal portion of the tumour towards the white boundary line of the area, but no vessels could be traced through that line into this area.

227. (*e*) *Medullary sarcoma* is a *fifth form* of malignant disease occasionally found in the liver — the *encephalosis* of several writers. The tumours produced by this morbid deposit are larger than scrofulous tubercles; and fewer, and more regular in form, than the scirrhous variety (§ 223.). They are originally developed in the same way as scirrhus, by infiltration into the minute capillaries, or into the tissue of the lobules, of a greyish white and opaque substance, which, as it accumulates, obstructs the circulation in the surrounding lobules. In their advanced state, the internal structure of these tumours consists of a loose cellular base filled with a soft and brain-like matter, often coloured with blood, or containing coagula from extravasation, in various stages of softening. As they increase in size, they become softer and more pulpy. This variety of malignant tumour seems to be identical with the second and third varieties of the "*tubera diffusa*" of Dr. FARRE.

228. (*f*) *Fungus hæmatodes*, or the *fungo-hæmatoid* tumour, is a *sixth form* of malignant disease met with in the liver, and is very intimately allied to the variety last described. In it there is a much more remarkable disposition to the development of new vessels, and to extravasation of blood, than in any of the preceding. As Mr. WILSON remarks, hard, cartilaginous, and scirrhous tumours may exist with those of a softer texture, and of a medullary form; and both of these may be mingled together in the soft, elastic, and bleeding mass, constituting fungus hæmatodes. Fungo-hæmatoid tumours are often of a large size, and give rise to severe symptoms, or to speedy death, by their frequent or copious hæmorrhages. They constitute the fourth variety of "*tubera diffusa*" of Dr. FARRE; and have been fully described in the article on Fungo-hæmatoid disease.

229. M. CRUVEILHIER considers the venous capillary system to be the seat of all these varieties of malignant disease, more particularly of the fifth variety. He states that he found the ramifications of the vena porta filled with the peculiar matter constituting the principal part of the malignant tumour, and that it adhered to the parietes of the vessels, which became in consequence greatly dilated. The alteration was confined to the ramifications of the portal vein, the hepatic veins and their distributions were completely sound. — (*Anat. Patholog*. liv. xii.)

230. *D. Melanosis* exists in the liver, in either of the following forms: — 1st. As a secretion infiltrating the cellular structure of the organ, and giving a general blackness to the substance of the

lobules: — 2d. As a morbid mass, composed of an areolar cellular net-work, in which the black carbonaceous matter is deposited: — 3d. As a melanic pigment accompanying tubercle or carcinomatous tumours, and imbuing the morbid structure with its colour. Melanosis varies in shade from a deep chocolate brown to a rich black. It rarely, or perhaps never, exists in the liver, without being met with in other organs, or parts of the body. (See art. MELANOSIS.)

231. *E. Simple cerous cysts* are sometimes found in the liver, and are mistaken for hydatids. These cysts contain a watery fluid; their inner surface is similar to that of serous membranes; and their external surface is either adherent to the part in which they are embedded, or is surrounded by condensed cellular substance. These cysts are altogether different from the fibrous cysts, which contain within themselves a number of detached smaller cysts or vesicles, and which are next to be noticed.

232. *F. Hydatids* or *Acephalocysts* are frequently found in the liver, inclosed in a fibrous cyst, and contained in a single parent hydatid vesicle. The hydatid cyst generally occupies the right lobe of the liver, and is most frequently situated very near the surface. It increases to a very great size, causing absorption of the structure of the organ, and opening into other viscera, after adhesions have been formed between them and the external cyst. Hydatids present the same characters in this organ as in other viscera. (See art. HYDATIDS.) When they are numerous, or when the cyst reaches a great size, a tumour is perceived or detected by touch in the region of the liver. The tumour is generally without a hardened base, circumscribed, soft, and yielding; is unaccompanied by the symptoms indicative of abscess; has not been preceded by indications of acute or sub-acute hepatitis; and is not attended by the constitutional evidences of cancerous disease. The external cyst is sometimes hardened by deposits of cartilaginous or bony plates. The enveloping cyst may open: — 1st. Externally through the abdominal parietes: — 2d. Into the cavity of the peritoneum. — 3d. Into some part of the alimentary canal, particularly the stomach and colon: — 4th. Through the diaphragm into the pleural cavity; — and 5th. Into the bronchi, whence the small hydatids may be expectorated. Some small cysts have occasionally been found in the liver containing a calcareous deposit, mingled with a membranous substance resembling fragments of hydatidic sacs. These cysts are supposed to result from the spontaneous cure of hydatids.

233. *G. Intestinal worms* have, in rare instances, been found in the hepatic ducts, having passed from the duodenum along the common duct. It is very probable, however, that the worms have passed into the ducts after the death of the patient.

234. iii. DIAGNOSIS OF ORGANIC LESIONS OF THE LIVER. — The symptoms of most of the structural changes of the liver are very equivocal, as many of them are common to several of these changes, as well as to certain states of functional and acute diseases of the organ. I shall therefore endeavour to determine the dependence which may be placed upon each of these symptoms or signs, in estimating the seat and nature of the malady which occasions them.

235. *A. Pain* or *uneasiness* in any part of the region of the liver may arise not only from disease of this viscus, but also from diaphragmatic or costal pleuritis, or from partial peritonitis in the vicinity of the organ; from disease of the pylorus or duodenum, or of the pancreas; from flatulence affecting the duodenum or the right arch of the colon; from fæculent accumulations in the colon; or from disease of the substance or pelvis of the right kidney. Pain in its most severe states has been attributed above (§ 62.), either to neuralgia of the nerves supplying, or connected with, the liver, or to the irritation of gall-stones in the biliary passages. It should, moreover, be recollected that, during the progress of structural changes of the liver, little or no pain, or merely uneasiness, may be felt in it, whilst symptomatic pains may exist in distant parts, chiefly however of the right side; the organic lesion not materially disturbing the sensibility of the nerves of the organ themselves, but exciting, through their medium, the sensibility of some portion of the spinal nerves of sensation. Next to the pain occasioned by gall-stones, neuralgia, and acute inflammation, that produced by malignant disease of the liver is the most severe. Hydatids, fatty deposits, hypertrophy, cirrhosis, granulations, indurations, and small secondary abscesses, are attended by little or no pain, especially in the hepatic region. The pain varies as respects its seat and extent. It may be *limited* to a particular point, or *diffused* over the whole hepatic region, affecting not only the right hypochondrium, but also the epigastrium, the back, the lower part of the right thorax, the right shoulder or apex, the left hypochondrium, &c. When it is limited, it may be seated in either of these parts, or it may change from one to another. It varies also in severity and in its character, as well as in its continuance. It is commonly more severe at one time than at another; or it presents exacerbations and remissions, or even complete intermissions. It may be felt only upon pressure, or in certain postures or positions. It is impossible to state any relation between the nature of the malady and the character of the pain or altered sensibility caused by it, as no such relation has been duly observed, or even perhaps exists. It is chiefly, however, in the more acute inflammations, particularly when seated in, or extending to, the surfaces of the organ, that pain is most continued as long as the inflammation is unsubdued. In all the other lesions, unless, perhaps, the sarcomatous form of carcinoma, the pain is remittent or intermittent, or developed only by pressure or by position.

236. *B. Swelling* or *tumour* has been already noticed, especially with reference to *abscess* (§ 140.), *hydatids* (§ 132.). In order to ascertain the existence of either, the patient should be carefully examined in the manner above described (§ 99.). He should also be examined whilst standing up, leaning forwards with his hands upon the back of a chair. The abdominal muscles will thus be released, and the liver will fall more anteriorly. The changes with which enlargement or tumour of the liver is most to be confounded are, distended gall-bladder and tumours connected with other organs, as the pylorus, the pancreas, the duodenum, the omentum or stomach. I have already shown (§ 145.)

how effusion into the right pleural cavity may so displace the liver as to occasion swelling or tumour beneath the ribs, from protrusion of the edge of the organ. Tumours, in the adjoining viscera just named, are often with great difficulty distinguished from those of the liver, whilst these latter are very readily mistaken for the former. Those which are situated in the hepatic region, or which are thus doubtful as to their seat and connection, have been divided into two kinds, as they seem to contain solid or fluid matter. This distinction, however, is not very easily made, especially when they are deep-seated, or when the patient is corpulent.

237. *a. Tumours containing fluid matters* are generally more or less *fluctuating;* but cases occasionally occur in which the fluctuation cannot be detected; as in a case about to be noticed. Fluctuating tumours are chiefly hepatic abscess, hydatid or serous cysts, and distended gall-bladder.—1st. *Tumour caused by Hepatic abscess,* as shown more fully above (§ 140.), is at first hard and diffused. Fluctuation is afterwards detected with great difficulty; appears gradually, and only in the centre, extending to the circumference, as it increases; the more prominent and fluctuating part being surrounded by swelling and hardness. 2d. *Hydatidic,* or *serous cysts* (§§ 231, 232.), give rise, in most cases, to a circumscribed tumour, more less fluctuating, elastic; but little or not at all painful, and unattended by diffused swelling or hardness at its base, or by redness of the surface, unless the cyst has reached the integuments, or has occasioned inflammation of the surrounding tissues.* 3d. *Distension of the gall-bladder* has been described in the article on the diseases of the GALL-BLADDER AND DUCTS; and the *diagnosis* between it and hepatic abscess fully stated (see § 22.).

238. *b. Solid tumours,* in or near the hepatic region, generally are connected with the liver, when they partially extend under the cartilages, and when they retain nearly the same position. Tumours of the omentum, stomach, or pylorus, generally admit of more or less motion. The swelling caused by congestion, or by inflammation, or hypertrophy, of the organ, is smooth and diffused. The enlargement or tumours produced by cancerous deposits, when attended by inequalities of the surface of the organ, sometimes may be distinguished by these characters, which may be evinced through the abdominal parietes when the patient is emaciated, and when the liver falls below the ribs. The celerity or slowness of the development of the enlargement or tumour will also assist the diagnosis: enlargements produced by congestions both appear and disappear the most rapidly, whilst those caused by hypertrophy and malignant deposits are the most slow and permanent.

239. *C. Jaundice* has been so fully considered, in the article devoted to that subject, especially in respect of its pathological relations, that no further notice need be taken of it as a symptom of hepatic diseases. Intimately connected with this state of the cutaneous surface, is the *appearance of the alvine evacuations.* Generally when there is jaundice, the stools are more or less pale; and, when organic lesions of the liver are attended by this state of the skin, the evacuations are often of a light drab colour, approaching to white. But in chronic alterations of the organ, unattended by jaundice, the motions are very irregular, both as to frequency, consistency, and colour: they are often very unequal or very different in colour — even the same evacuation exhibiting a great variety of colour, owing to the unequal discharge, and admixture of the bile in the stools. They are generally pale, offensive; often yeasty, whitish or clayey; and very rarely natural either as to odour or appearance. In the more chronic cases, discharges of blood, of varying quantity, are observed in the motions.

240. *D.* The *urine* presents appearances connected with the nature of the hepatic disease, and with the degree of obstruction to the secretion and excretion of bile. In some cases it assumes a deep yellow hue before the skin itself becomes discoloured; and it often deposits lithate of ammonia, of a bright pink colour, on cooling. In most cases where the structural change has existed for some time, or is extensive, and the jaundice is deep, the urine is as dark as porter, and is often also of a greenish tint. It is often also scanty and turbid, especially when dropsical effusions, particularly into the peritoneum, have taken place.

241. *E. Dropsical effusion* is a frequent attendant on far advanced structural lesions of the liver, and generally commences in the abdominal cavity, extending to the lower extremities only after the ascites has made considerable progress. When dropsy proceeds from disease of the heart, it generally observes an opposite course, the effusion commencing in the extremities, and afterwards extending to the large cavities. Cirrhosis or atrophy of the liver, induration, and the forms of degeneration which implicate the principal part of the substance of the organ, and impede or arrest the circulation of the portal system, always sooner or later are followed by dropsy. Indeed the abdominal effusion may be the first, and even the chief, indication of the hepatic malady. (See art. DROPSY, § 90. 96.)

242. *F. Hæmorrhages,* as has been shown in the article upon this subject, often attend the more chronic and extensive organic changes of the liver. This circumstance has been fully insisted upon by practical writers; and the same resistance placed in the way of the portal circulation, which, in one class of persons, is followed by ascites, in another class is productive of hæmatemesis, hæmorrhoids, intestinal hæmorrhage, or epistaxis;—in the one, serous effusion takes place from the peritoneal

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* A fibrous cyst or sac containing fluid or grumous blood was said to have been found connected with the liver in the case of a lady whom I saw in consultation with my friend Dr. BAIRD. She was advanced in age, was corpulent, and had been more corpulent than she was then. A large tumour was detected in the abdomen; it changed its position more or less with the change of posture, and often fell below the umbilicus. It seemed firm, and it evinced no fluctuation. Its mobility, situation, size, and hardness, induced Dr. BAIRD and myself to view it as a cartilaginous or solid tumour developed in the omentum. The patient complained of various gastric symptoms, but of little or no pain, until shortly before I saw her, and then the pain was referable chiefly to the irritation produced by the tumour in the peritoneal surface of the bowels, and other viscera with which it came in contact. This lady accompanied her husband to Malta, whither he proceeded to pass the winter; and there she died soon afterwards. The body was opened by the medical man who attended her there; but the account of the inspection furnished by him was so imperfect, as to contain nothing more than that a large fibrous tumour was found connected with the anterior edge of the liver, and contained grumous blood.

surface, in the other sanguineous effusion occurs from the digestive mucous surface, the tendency to either the one or the other depending much upon the vital condition of the membranes, in connection with the state of the blood itself, and the condition of the viscus, from which the hæmorrhage proceeds. Hæmorrhage also, like dropsy, may be contingent upon the hepatic lesion either before jaundice has appeared, or at any period subsequently, but most frequently after some degree of discolouration has at one time or other occurred. Occasionally jaundice has been present and entirely removed, and at some period more or less remote from its removal hæmorrhage from some part of the intestinal canal has taken place, proved critical for a time, or has recurred from time to time, or even been excessive. In some cases, particularly when it occurred at an advanced stage of the hepatic disease, and after jaundice has been deep, it has been very abundant, and has hastened a fatal termination.

243. *G. Cough* frequently attends enlargement of the liver, as well as acute, sub-acute, and chronic inflammations of the convex surface of the organ. It is most frequently observed when adhesions have been formed between the part of the viscus and the diaphragm, and when the enlargement has been so great as to drag the latter downwards, or to irritate the respiratory nerves.

244. Besides the above, various other symptoms attend chronic lesions of the liver, and which, although not constantly present, are still very frequently observed, and deserve attention and due estimation. Of these the most common are, emaciation, sallowness or pallor of the countenance, or a sickly appearance of the face and eyes; flatulence, and acrid or rancid eructations, irritating the pharynx; slight acceleration of the pulse towards evening, heat and dryness of the palms of the hands, drowsiness, or pain, or heaviness over the eyes. Occasionally a fissured or lobulated appearance of the tongue, which is sometimes also smooth and glossy, or loaded and foul, or more rarely furred in the middle and root, is observed. An irregular or partial perspiration often breaks out, and is frequently greasy and offensive, especially at night, or when it is copious. The existence of malignant formations in the liver may occasionally be inferred from the state of the stools and urine, in connection with the general cachexia and anæmia attendant on the advanced stages of those maladies, and sometimes with manifestations of them in most external or superficial parts; but much uncertainty always attends their diagnosis.

245. iv. TREATMENT OF THE STRUCTURAL LESIONS OF THE LIVER.—It is obvious that the treatment of these lesions must necessarily be a matter of difficulty and uncertainty, inasmuch as most of them cannot be ascertained with any degree of precision during the life of the patient. It is chiefly in cases of enlargement of the organ that admits of recognition, or of serous or hydatidic cysts of considerable size, that means of cure can be appropriately or successfully employed. When fluid, semi-fluid, or solid matters are deposited in the liver, so as to enlarge or obstruct it, a reasonable expectation may be entertained of removing them, by the aid either of medicine or of diet and regimen. Hitherto, however, the means which have been considered most suitable for this purpose have not been such as could admit of a very successful application. Whatever means may be had recourse to should be directed with the following intentions: — 1st. To the removal of the morbid lesion presumed to exist: — 2d. When this object is unattainable, to retard its progress: — and 3d. To alleviate its effects.

246. *A.* The *first intention* was formerly attempted to be fulfilled by courses of mercury, followed by mineral waters, &c.; and subsequently, and often less injuriously, by the nitro-hydrochloric acid baths. That mercurials were often injuriously employed in many cases of this kind, even where they might have been advantageously prescribed, if they had been directed with greater knowledge of the powers of the various preparations of this mineral, especially in various modes of combination, I have had sufficient opportunities of observing. The error which has commonly characterised the employment of mercurials in organic lesions of the liver, is the exhibition of them, either in doses and forms, or with a frequency and continuance, which are calculated to sink the vital powers, and to weaken the resistance opposed by the constitution to the extension of the local mischief. Where, however, the organic lesions are the more immediate consequence of sub-acute or chronic inflammation, a judicious combination of the mild preparations of mercury with diaphoretics or antimonials, as PLUMMER's Pill with soap and taraxacum, blue pill with antimonials, or with small does of *colchicum*, &c., and a recourse to external derivations, as issues, setons, &c., are often of service.

247. As early as 1823 I had recourse to the preparations of *iodine*, especially to the *iodide of potassium* and *iodide of mercury*, in the treatment of those lesions of the organs attended by enlargement, or characterised by torpor of function, absence of fever, and dropsical effusion from impeded portal circulation; and since then, as stated in the early part of this work (see art. DROPSY, § 103.), I have continued to employ this substance, in some one of its forms and combinations, more especially the iodide of potassium, for the removal of these lesions. Long subsequently to the period just named, this medicine has been resorted to by other physicians in the treatment of organic changes of the liver; but the preparations of it employed, or the doses in which they have been exhibited, or the modes of combining them, have been such as were little calculated to prove beneficial, particularly in the cases for which they were prescribed. In many instances they were exhibited in too large doses, and were inappropriately combined: in others, they were unsuited to the existing pathological conditions. In the first place, the preparations of iodine may prove injurious, by exciting or developing inflammatory action, where it already exists in a sub-acute or latent form, or where a strong tendency to it is present, especially when they are given in large doses, or when those which are more acrid are employed. Where inflammatory action implicates more particularly the surface or membranes of the organ, still greater caution in the use even of the milder preparations of this substance is requisite. It is chiefly when enlargement, obstruction, or torpor of the liver occurs after periodic fevers, or in the scrofulous diathesis, either alone or as a cause of dropsy,

that iodine, particularly the *iodide of potassium*, employed either externally or internally, or both, and in conjunction with other deobstruents, as the *liquor potassæ*, or alternated with purgatives, has proved most beneficial in my practice. In these cases, the iodide of potassium, conjoined with liquor potassæ, may be given with the preparations of *taraxacum*, or of *sarsaparilla*, or in mild, bitter, or stomachic infusions; whilst an ointment containing the iodide (ʒ½ of the latter to ℥j. of the former) may be rubbed over the right hypochondrium, or a *plaster* may be kept applied in this situation, consisting of equal parts of the emplastrum ammoniaci cum hydrargyro, and the emplast. picis compositum.

248. In those cases of enlargement of the liver which are attended by pain, or by sub-acute inflammatory action in some part of the surface of the organ, as well as in other cases where the above means either are inappropriate, or have failed, the *bi-tartrate of potash* in conjunction with the *bi-borate of soda*, in as large doses as the stomach and bowels will tolerate, has often proved remarkably beneficial, especially where the hepatic lesion has superinduced either dropsical effusion, or hæmorrhage, or jaundice. The *nitro-hydrochloric bath*, or lotion, or a course of *these acids internally*, or of the nitric acid alone, may be tried, particularly in enlargement of the liver, as advised above, and aided by deobstruent purgatives, or other appropriate remedies. As regards other means of removing structural lesions of the liver, it is unnecessary to add to what has been fully stated when treating, in the articles Dropsy, Hæmorrhage, and Jaundice, of the most frequent consequences which they produce.

249. *B.* The *second* and *third intentions* of treatment comprise not only the means already mentioned, which can, when they fail in accomplishing the *first* indication, sometimes fulfil the *second*, but also those remedies which have been more especially noticed with reference to those serious symptoms or consequences of organic lesions of the liver just referred to. It is obvious that, when we fail in removing these lesions, some one or more of these consequences will accrue — either *dropsy*, or *jaundice*, or *hæmorrhage*, particularly from the digestive mucous surface, or any two or more of them; and that, either before they may have appeared, or subsequently, those means which I have advised, appropriately not only to either of these superinduced affections, but also to the original malady, should be employed. What these means are will fully appear on a reference to these subjects, especially at the places where they are treated of in connection with hepatic lesions.

250. In most of the more chronic and extensive lesions of the liver, it is necessary, even whilst we employ means to remove them, to retard their progress, or to alleviate their consequences, to support the constitutional powers and improve the general health by medicine, by diet, and by air and regimen. In some cases, restoratives or mild tonics may be conjoined with alteratives, deobstruents, and anodynes: thus the oxides or other preparations of iron may be given with iodine or some one of its preparations, or with the liquor potassæ, and with narcotics or anodynes, according to the nature of the case, especially in the malignant alterations of the organ, when pain sometimes becomes a prominent feature of the malady. In other chronic cases, water impregnated with *chlorine*, or *chlorine fumigation*, as advised by Mr. Wallace, may be prescribed with temporary advantage, as tending not only to excite the functions of the liver, but also to promote the constitutional powers. With these views, certain of the chlorides may be employed, and more especially the chlorate of potash. When there is no tendency to inflammatory action, the bisulphate of potash may be given in the infusion of roses, either with or without small doses of quinine. In cases of enlargement of the liver consequent upon obstinate or repeated attacks of ague, the bisulphate of potash, prescribed so as to act freely on the bowels, is often most serviceable.

251. *C.* The *Diet*, in all diseases of the liver, should receive the strictest attention. The chief rules to be observed are — 1st. To allow only the most antiphlogist diet and regimen when any inflammatory action, or any febrile symptoms, are present: 2d. To recommend the most digestible food in small, or at least very moderate quantity, in all other cases: and, 3d. To advise the adoption principally of farinaceous articles of food; and to allow only a small quantity of the lighter kinds of animal food, once in the day, even in the more chronic and least severe cases. A milk diet is generally of use, especially when the milk is taken with the addition of a small quantity of lime water, or liquor potassæ, or Seltzer water. A diet consisting of milk and the farinacea is very generally appropriate, especially when it is found to agree with the patient.

252. Regular exercise, particularly on foot, or on horseback, sea-voyaging, and warm clothing, the general surface being covered with flannel, are also requisite aids to medical treatment. Change of air, especially to a cool, temperate, and healthy locality, and to a dry and elevated situation, is also of much importance. When such a change can be conjoined with the use of deobstruent saline springs, additional benefit will accrue. In torpid states of the liver, after a long residence in a warm climate, or in chronic affections of the organ, particularly those connected with congestion, enlargement, or infarction, the deobstruent and purgative mineral waters are generally of service. The waters of *Cheltenham*, *Leamington*, *Harrowgate*, or those of *Carlsbad*, *Kissengen*, *Marienbad*, *Homburg*, of *Pulna*, *Seidschutz*, &c., and the artificial mineral waters prepared at Brighton, are severally productive of benefit, when employed appropriately to the varying features of the case, or even of the same case, at different periods of its progress. It is very manifest that the more purgative waters, and those which are most refrigerant and deobstruent, are most suited to cases characterised by enlargement, congestion, or infarction, or attended by febrile commotion: but, in other circumstances, especially where loss of appetite, nausea, debility, rancid evacuations, heart-burn, torpor of the liver, &c., are present, and particularly if these symptoms are aggravated or appear during a course of these waters, those which possess restorative, in conjunction with deobstruent powers, are the most appropriate, and should at least be tried. In many cases the good effects of the waters will be promoted by a recourse to the same waters, as

tepid or *warm baths*, or at a temperature prescribed according to the peculiarities of the case.

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LUMBAGO. See Rheumatism.

LUMBRICI. See Worms.

LUNGS — Diseases of. — Syn. *Πνεύμων, ονος.* — *Pulmo*, Lat. — *Poumon*, Fr. — *Lunge*, Germ. — *Polmone*, Ital. — *Lung*.

1. I shall confine myself, at this place, to the

consideration of those diseases which are seated in, or affect chiefly, the substance, or proper structure of the lungs, and which are independent of constitutional peculiarity or affection, and of the diseases of their investing membrane, and of those of the air-passages and tubes, with which, however, diseases of the substance of the lungs are very often associated. Under the heads BRONCHI, CROUP, HOOPING-COUGH, LARYNX, and TRACHEA, &c., the maladies of the air-passages and tubes are fully discussed; whilst under PLEURA, TUBERCULAR CONSUMPTION, ASTHMA, HÆMORRHAGE-PULMONARY, &c., those affecting the investing membrane of the organ, as well as those which, although seated chiefly or even primarily in the lungs, depend upon diathesis, and extend to other parts and organs, are severally treated of. In thus confining myself to the diseases which are more intimately connected with, or are proper to, the substance or parenchyma of the lungs, I shall first consider *Inflammations of the Lungs*, and, subsequently, *emphysema, œdema, and structural changes of the organ*. The other maladies seated in, or implicating the lungs and air-passages, are, as just hinted at, discussed either under their usual names, or under the head BRONCHI and PLEURA.

I. INFLAMMATION OF THE LUNGS. — SYN. Πνεύμονια, Περιπνεύμονια (from πνεύμων, the lung); Περιπνεύμονικη Νόσος, Dioscorides; *Pneumonia*, Cullen, Parr; *Peripneumonia*, Auct. var.; *Pulmonia*, *Pulmonaria*, Auct.; *Peripneumonia vera*, Sauvages; *Febris Pneumonica*, Hoffmann; *Pneumo-pleuritis*, Dolæus; *Cauma Peripneumonia*, Young; *Empresma pneumonitis*, Good; *Pneumonitis*, Swediaur and Hildenbrand; *Inflammation des Poumons Peripneumonié*, Fr.; *Lungenentzundung*, *Entzundung der Lungen*, Germ.; *Pulmonia*, *infiammazion del Petto*, Ital.; *Peripneumony*.

CLASSIF. — 1. *Class*, 2. *Order* (*Cullen*). 2. *Class*, 3. *Order* (*Good*). III. CLASS I. ORDER (*Author*, in *Preface*).

2. DEFIN. — *Rapid, short, and sometimes oppressed, respiration; cough and expectoration; general feverishness, and uneasiness referrible to the lungs.*

3. PATHOL. DEFIN. — *Inflammation and its usual consequences in the parenchyma of the lungs, often implicating the small bronchi and air-cells on the one hand, or the pleura on the other, or either, more particularly or exclusively.*

4. Of the numerous symptoms attending pneumonia there are, perhaps, none which are present in all cases, excepting the above. The auscultatory signs vary with the stage and intensity or extent of the disease, and, therefore, are not comprised in the above definition. It was shown by me, in the article BRONCHI (§§ 41, 42.), and subsequently by Dr. STOKES, that, although pneumonitis may originate in the cellular tissue or parenchyma of the lungs, yet it very frequently arises from an extension of the inflammatory action from the small bronchi to the air-cells and substance of the organ — a mode of origin which had been generally overlooked until I insisted upon it, and contended that the inflammation, when thus originating, may not be confined to the parenchyma of the lungs and the minute bronchi and air-cells, but be extended even to the pleura, producing the usual consequences of pleuritis, as will be more fully shown hereafter. It will be preferable first to consider the *primary* and *simple form of pneumonia*, and afterwards to notice its *principal varieties* or *modifications* and *complications*.

i. PRIMARY ACUTE PNEUMONIA. — SYN. *Pure Pneumonia; Sthenic Pneumonia; Pneumonia vera; Simple Pneumonitis; Primary Pneumonitis.*

5. *A. The primary seat of Pneumonia* has not been determined with due precision, but has been a subject of some discussion. Several writers have believed it to commence in the plexus of vessels and sub-mucous tissue uniting the minute extremities of the bronchi and air-cells; others state, in general terms, that it is seated in the connecting filamentous or cellular tissue constituting the parenchyma of the organ. Dr. WILLIAMS considers "the capillary ramifications of the pulmonary artery and veins to be the proper seat of pneumonia, and that these may involve more or less of the tissues through and around which they pass." — Dr. STOKES describes pneumonia as "inflammation of the cells and minute tubes, and believes that it differs from bronchitis, in the ordinary acceptation of the term, merely in the occurrence of the phenomena of a parenchymatous inflammation, such as solidification, suppuration and abscess — phenomena not proceeding from any inherent difference in the diseases, but a result of anatomical structure." This, however, is all that is contended for. The structure in which the inflammation is seated being such as gives rise to those phenomena when inflamed; other phenomena resulting from inflammation of the bronchial tubes. There can be no doubt, however, that inflammation of the air-cells and minute bronchi will so fill up and obliterate them with the usual products of this state of morbid action, as to give rise to appearances similar to those consequent upon an infiltration of the same products in cellular or parenchymatous structures; and that, when the inflammatory action originates in the latter, it will give rise to changes similar to those produced by it when commencing in the minute tubes and cells; inflammation of these latter being rarely confined to them, but extending to the parenchyma, or filamentous tissue of the organ; or, in other words, that the morbid action may originate and predominate in either series of structures, but that it rarely continues without implicating both.

6. The French pathologists, and after them some recent English writers, have distinguished the disease into *lobar*, *lobular*, and *vesicular*, according as it extends to the whole or continuous parts of lobes, or is limited to certain polygonal subdivisions of these, or to single bunches of vesicles. —*a*. Of these the *lobar* is the most common; it may be confined to an irregular portion of a lobe, or may extend to a whole lung, or to a great part of both lungs. When the inflammation is very extensive it commonly exists in different degrees of advancement, as will more fully appear in the sequel.

7. As to the parts of the lungs most frequently attacked, MORGAGNI, FRANK, BROUSSAIS, &c., judging from *post mortem* inspections, inferred that the upper lobes were oftener affected than the lower; whilst LAENNEC, ANDRAL, CHOMEL, and others, comprising the slighter cases and those of recovery, considered that the lower lobes were most frequently inflamed. M. CHOMEL found, out of 59 inspections, that the apex was

attacked in 13, the base in 11, and the whole or central parts in the others. In general, the upper lobes are more frequently affected than the lower in the most dangerous cases, and when the disease assumes a low or adynamic form. M. ANDRAL found in 80 cases, 57 of the lower lobe, 30 of the upper, and 11 of the whole lung. The proportion, however, in which the upper lobe is affected appears greater, according to this calculation, than obtains in this country.

8. *b.* In the *lobular* state of pneumonia, the inflammation is confined to a few isolated lobules, being limited by the interlobular cellular tissue, and appearing as lozenge-shaped or polygonal patches of red, engorged, or hepatised tissue. This form seems to commence at the same time in several distinct parts, and is most frequently observed in cachectic persons, or subsequently to phlebitis, accidents, operations, &c.

9. *c.* The *vesicular* form of pneumonitis has been distinguished by M. ANDRAL. He supposes it to be confined to the air-cells or vesicles. It appears as little red spots, varying in size from that of a pin's head to that of a hemp-seed, and in colour from a blood to a livid red. It is not often observed, at least in a distinct form, unless the colour of the lung be light. The tissue of the organ surrounding these red spots are sometimes healthy, and they often contain the miliary granulations of BAYLE.

10. *d.* As to *the lung* most frequently attacked, Dr. FORBES has shown, from the observations of ANDRAL, CHOMEL, and LOMBARD, that, out of 1131 cases, the right lung was affected in 562 cases, the left in 333, and both the right and left in 236; in every ten, five being in the right, three of the left, and two in both. Dr. STOKES remarks, that this very nearly agrees with his experience; but that double pneumonia is more frequent than appears from this statement; for it commonly happens, that although disease greatly preponderates in one lung, more or less of it may be detected by a careful physical examination in the other, even when pain or uneasiness is not referred to it. He further observes, that inflammation of the right lung is oftener of the sthenic, and that of the left of the nervous or typhoid character. According to my own experience, it is undoubted that double pneumonia most frequently occurs in the previously diseased or cachectic, in the nervous or debilitated, in states of the air causing vital depression, and during epidemic constitutions, or in the course of epidemic diseases, characterised by impaired tone and lowered vital resistance.

11. *B. Usual Course of simple Sthenic Pneumonia.* —*a. Certain premonitory symptoms* are often observed, unless the disease proceeds from the more violent causes, or from wounds or accidents. These consist of oppression in the chest; a slight short cough; quickness and shortness of breathing, especially on motion, speaking aloud, or on ascending an eminence; languor, and occasional sighing. These usually continue a day or two, and are followed by those characterising,

12. *b. The invasion* of the disease. This event is indicated by marked rigors or chills, continuing from half an hour to one, two, or more hours. These are not, however, observed in all cases, or are so slight in some as to escape notice. Attending this state of febrile exordium, and in addition to the usual concomitants of it, anxiety, difficulty of breathing, oppression in the chest; short, dry, or suppressed cough; general uneasiness, loss of appetite, &c., are usually complained of.

13. *c.* The *increment* or *developement* of the disease follows the disappearance of chills or rigors. Animal heat gradually increases until it assumes a marked character; and with it are developed vascular reaction, vital turgescence, and general orgasm of the circulation. The symptoms especially referrible to the inflamed organ now more particularly manifest themselves.

14. Respiration becomes short, frequent, anxious, and difficult; is attended with unusual expansion and elevation of the chest; with a frequent, small cough, and increased warmth and moisture of the expired air; and, as the disease advances, is performed chiefly by the diaphragm and abdominal muscles, the chest apparently remaining unmoved, especially on the side chiefly affected. The patient is unable to take a deep inspiration, the turgid and inflamed lung being incapable of further expansion; nor is he able to expire freely, the organ being equally incapable of collapsing; and he lies, in preference, on the affected side, or, if both lungs are diseased, in the supine posture. There is a constant feeling of uneasiness, rather than of pain, complained of in the chest, with anxiety, a sense of constriction, fulness, internal heat, and of weight. There are constant restlessless, inquietude, and tossing, with frequent attempts to elevate the chest and shoulders, proceeding from the great vascular turgescence of the lungs, and obstacle to their further expansion, to attempt which the patient feels irresistibly called. The cough at the commencement is dry, troublesome, and short, accompanying almost each expiration, especially after a full inspiration, and constant: it afterwards becomes more moist, and is attended with a scanty mucous, crude, or albuminous expectoration, of a saffron hue, or streaked with blood. Still the dyspnœa is slight, respiration being quick, short, and frequent, but not difficult.

15. Sometimes a lancinating pain darts through either side of the chest, indicating irritation of the pleura, proceeding either from coëval and consecutive inflammation of a portion of pleura, or merely from the unusual degree of tension experienced by this membrane, owing to the turgid or expanded state of the lung enveloped by it. In the former case, the pleuritic pain is sharp, acrid, continued, and fixed to one part; forming the very frequent *complication* of inflammation of the substance of the lungs with inflammation of its investing membrane, or *pleuro-pneumonitis*, which will be more fully noticed hereafter. In the latter case it is less fixed or continued, and disappears as the vascular turgidity diminishes, and upon the first approaches towards a resolution of the disease.

16. The symptoms which have a sympathetic relation to the disease are less constant, and are less to be depended on than the above and the physical signs (§ 48.): they have generally more reference to the degree of symptomatic fever than to the extent of local disease. They chiefly consist of turgidity of the countenance, with flushing of the cheeks, sometimes circumscribed, particularly towards the period of the evening; febrile exacerbation; gravative head-ache,

vertigo, suffusion and watering of the eyes; a humid tongue, covered by a thick mucous coating; constant thirst; anorexia; tension of the abdomen, with increased action during respiration, and peculiar uneasiness about the insertion of the diaphragm; costiveness; scanty, high-coloured, reddish, crude or turbid urine, with scalding upon voiding it; palpitation of the heart; great action of the arteries; a quick, full, and hard pulse, — in children so quick as scarcely to be counted. The pulse is also sharp; but the hardness generally ceases early in the disease, and it often becomes soft, weak, or small. In some cases, it is soft and small from the commencement. As the disease advances, lethargy or symptomatic delirium sometimes occurs; or more rarely, and in still more unfavourable cases, sopor or coma, more or less profound, supervenes. Blood taken from a vein is more thick and dense than usual, and exhibits a thick, tenacious crust on its crassamentum, with little serum, or the coagulum is very firm and large.

17. The more severe the disease, and the more extended its seat, the more intense are all the symptoms, both local and general. They are always exacerbated towards evening and ameliorated in the morning. When both lungs are inflamed, all the foregoing symptoms are particularly marked, and vital power more prostrated or more readily exhausted, the constitutional symptoms assuming more of the adynamic character; but even when both are affected, the inflammation is generally limited to portions of them only.

18. When one lung only is inflamed, the sense of heat, tension, weight, &c., is chiefly confined to the same side as it, and on this side the patient lies with most ease; reclining on the unaffected side producing great anxiety and uneasiness. Respiration also is performed unequally, or only by one side of the chest, that containing the inflamed lung being nearly inactive during inspiration, but considerably elevated.

19. Circumscribed redness of the cheek of the same side is often observed, and frequently, particularly in children, the hand and wrist of the affected side are red and turgid, apparently owing chiefly to the pressure on the upper part of the arm, from constantly lying on the affected side.

20. *d.* The *Period of fully developed Disease* occurs in from three to five days, according to the severity of the attack. The symptoms continue for some time afterwards, generally for three, but seldom beyond five days, with slight exacerbations and remissions, especially when left to nature or inefficiently treated, and with occasional signs of a disposition to crisis. The dyspnœa is then more urgent, and the respiration short and rapid. The head and shoulders require to be raised. In the worst cases, inspirations are short, forced, and as frequent as from 40 to 50, or even 60, in a minute. The expectoration is then very viscid, tenacious, streaked with blood, or more deeply and intimately tinged by it. The pulse is quicker, weaker, and smaller; the strength more depressed, and the tongue is more loaded, and sometimes dry. In a few cases, where temporary ameliorations and exacerbations occur, the disease is protracted several days beyond the period just mentioned.

21. *e.* The disease may continue, or even increase, notwithstanding the treatment. In such very *unfavourable* or *fatal cases*, the thorax remains expanded, or scarcely acts, during respiration, which is chiefly diaphragmatic, or acts suddenly, forcibly, or convulsively: the patient is oppressed with the utmost anxiety, harassed by continued cough, dosing occasionally, or lapsing into a dreamy delirium, until the lungs having become nearly unfit for the office of respiration, or nearly impermeable to the air, he is entirely suffocated. This event is generally preceded by a bloated, pallid, or cadaverous countenance, which is bedewed with a cold sweat; by livid lips, dark or livid tongue, great difficulty and quickness of respiration; by suppression or change of the appearance of the sputa, which become greenish, dirty-red, rusty, or like prune-juice, and fœtid; by a rapid, thready, irregular or intermittent pulse; and by a gasping, convulsive, and rattling respiration. This unfavourable change often happens during the evening exacerbations, or perturbating efforts of nature to establish a critical evacuation.

22. A *favourable result* is sometimes preceded by a gradual disposition to a crisis, which is occasionally decided, and sometimes interrupted or abortive. This issue generally is observed to occur in the morning on the fifth, seventh, ninth, eleventh, or fourteenth day of the disease — very rarely so late as the twenty-first day. The evacuations which are most beneficial are copious and general perspiration, hypostatic urine, a free mucous expectoration, epistaxis, and the catamenial and hæmorrhoidal fluxes.

23. In ninety-three cases, M. Andral observed that the recoveries on critical and non-critical days was as fourteen to three.

24. *f.* The *Decrement* of the disease always follows the subsidence of the morbid condition of the organ, whether brought about by the conservative influence of the vital energies or by art. The vascular turgidity, infiltration, and condensation of the parenchyma of the lungs gradually diminish, the functional disturbance decreases, and all the symptoms at first subside, and afterwards some of them entirely disappear: but those which were first to manifest themselves, as cough and oppression at the chest, are the last to depart. Some degree of quickness of pulse and of breathing generally continues for some time. When these are removed, *convalescence* has commenced; but convalescence can never be confided in, until these symptoms have entirely disappeared.

25. Acute pneumonitis, marked by no anomaly, complicated with no other malady, and occurring under favourable circumstances, generally proceeds as now described, and most frequently to a favourable issue. But it does not always observe this course. It is sometimes of much longer duration. In some cases it assumes, from the commencement, a more adynamic, or a complicated, or an otherwise unfavourable character. Occasionally unwonted and accidental symptoms manifest themselves in its progress, owing to various contingent causes operating during its continuance; and in other cases the whole tendency and character of the disease becomes changed, owing either to causes proper to the individual affected, or to a peculiarity of the nature and combination of the external agents which produced it, or to the state of the season or of the atmosphere, or to the epidemic constitution upon which it may supervene.

26. *g. Relapses* of pneumonia are not infrequent during some period of convalescence. They are indicated by a recurrence of the characteristic symptoms — chiefly by slight dyspnœa, short frequent respiration, oppression in the chest, cough, viscid or sanguineolent expectoration, and by increased frequency and weakness of pulse. In cases of relapse, the lungs often become more extensively affected, and the attendant fever assumes a less sthenic form than the first attack — even an adynamic character. This is owing to the reduction of nervous power, and to the imperfect change effected in the state of the blood. Hence relapses are always more dangerous than a first seizure, and are more rarely attended by critical evacuations.

27. ii. STRUCTURAL CHANGES MARKING THE STAGES OF PNEUMONIA. — LAENNEC described *three stages*, with their corresponding symptoms and signs. In his *first stage*, the lung is engorged with blood, and a crepitating râle is heard. In the *second*, solidification takes place, and gives rise to its characteristic physical signs. In the *third stage*, interstitial suppuration occurs; or a state of softening, preceding the formation of abscess. I agree with Dr. STOKES, who contends for a stage antecedent to that which M. LAENNEC has called the first. He observes, that the existence of crepitation indicates that secretion has taken place in the cells and minute tubes, so that LAENNEC's first is, in reality, the secretive stage of the inflammation, and every analogy favours the opinion that a stage of irritation has existed previous to the secretion which caused the crepitus. It is obvious that this first stage of irritation and capillary injection can be but very rarely seen, unless death has proceeded from other causes; but in these circumstances I have observed, as remarked by Dr. STOKES, portions of the substance of the lungs of a bright vermilion colour, and even drier than usual. It is sometimes met with in parts of the lungs where the first and second stages of LAENNEC exist; and I have seen it in portions of the organ, after death from hæmoptysis and acute phthisis, with which, as I shall show in the sequel, pneumonitis is not infrequently complicated.

28. The *stages* of pneumonia, therefore, are,— 1st. Intense capillary injection — no effusion into the cells: — 2d. The cells and parenchyma engorged with blood, without actual disorganisation — sanguineous engorgement — first stage of LAENNEC: — 3d. Solidification, with some degree of softening — red hepatisation — the red softening of ANDRAL — second stage of LAENNEC: — 4th. Interstitial suppuration — yellow hepatisation — the third stage of LAENNEC. *Abscess* and *gangrene* are contingencies of comparatively rare occurrence.

29. *A.* In the stage of *sanguineous engorgement*, the substance of the organ is red, but of different shades, is heavier than usual, and is still crepitant. The cells are not yet filled by effused fluid; or, if any infiltration into them or into the interstices of the filamentous tissue has taken place, it is only slight, unless, indeed, in cases of asthenic or cachectic pneumonia, or when the disease follows inhalation of noxious gases, or occurs in the course of low fevers or exanthematous maladies; and then this state of engorgement may pass very rapidly, and without any appreciable crepitation, into the stages of suppuration, or into a half-suppurative and half-gangrenous state. In the usual sthenic form of the disease, however, with capillary engorgement, there are some degrees of thickening of the membranes between the cells, and slight effusion of lymph, to which the apparent thickening probably is chiefly owing.

30. *B.* The stage of *solidification* and *softening*, or of *hepatisation*, presents the former stage in a more advanced state — in a state of more or less rapid progression to the next. In this stage the effusion of lymph, often more or less coloured by red particles of blood, has taken place into the parenchyma and air-cells of the part affected. The density thus produced is generally so great that this part sinks in water. It is also more friable, from the interstitial infiltration of lymph having weakened the vital cohesion of the tissues, as shown in the art. INFLAMMATION.

31. Dr. STOKES agrees with ANDRAL in supposing that this solidification arises not from any deposition of lymph, but merely from excessive congestion of blood; and in proof of this he argues that the rapid appearance of this stage, and the rapid subsidence of the symptoms attending it, are evidences of no further change than congestion. But this is to assume that excessive congestion is attended by the same phenomena as accompany infiltration of lymph; and these occurrences are no disproofs even of effusion of lymph having occurred, for it is well known that absorption in the lungs is sometimes remarkably rapid.

32. The colour of the solidified portion of lung varies, according to the quantity of blood injecting the capillaries, from a red to a pinkish brown or reddish grey; but it is modified by the quantity of lymph infiltrating the part, and by the presence of black pulmonary matter. Frequently when a portion of hepatised lung is divided, numerous little granulated points, the size of pins' heads, and of a lighter colour than the surrounding tissue, appear. LAENNEC considered these to be the air-cells converted into solid grains by thickening of their parietes, and by the obliteration of their cavities by a concrete fluid. ANDRAL viewed them as single air-cells or terminations of the bronchi distended by a viscid mucus from their mucous linings. If this be the case, and if it be not coagulated lymph, the mucus must have become concrete during its retention. It is, however, most probable, that these granules are produced by an infiltration of lymph into the cells or minute tubes, as well as into the connecting cellular tissue.

33. In some cases the solidified lungs are devoid of the granular appearance just noticed, and are of a more uniform and deeper red than the foregoing. M. ANDRAL attributes this state to a more uniform and complete obliteration of the cells; but if such is the case, there must have been also more intense capillary injection. Dr. WILLIAMS thinks that this non-granular form of hepatisation may be ascribed to the circumstance of the inflammation having been confined chiefly to the intervesicular tissue. MM. HOURMANN and DECHAMBRE have also distinguished the *granular* from the *non-granular* form of solidification, and have designated the former *vesicular* pneumonia, and the latter *interlobular*. Dr. WIL-

LIAMS's appellation of *intervesicular* is, however, more appropriate.

34. *C.* The stage of *interstitial suppuration*, or of *puriform infiltration* — of *yellow hepatisation*, — is merely the conversion of the affused lymph and red particles of the previous stage into an opaque, pale yellow, soft, and semifluid matter, and ultimately into a purulent liquid, which infiltrates the inflamed part. This conversion takes place in the manner shown in the articles ABSCESS and INFLAMMATION; but the matter rarely is confined in the form of a defined abscess, but is more or less diffused, owing to the structure of the organ, through the part affected. Owing to the organisation of the lungs, a distinct abscess is rarely formed, because the lymph thrown out can rarely confine the matter, or prevent its infiltration of surrounding parts, by completely obstructing the minute tubes, cells, and pores permeating the inflamed part.

35. *a. Abscess*, therefore, cannot be considered as a stage of pneumonitis, but merely a contingency of comparatively rare occurrence, but not so rare as LAENNEC and some others have supposed. I agree with Dr. STOKES in believing that the rarity of pneumonic abscess has been much overrated; and it is most probable that LAENNEC was partly deceived by trusting too implicitly to the physical signs, to the neglect of the rational symptoms, in his observations. Attention to the whole course of the case, and to the succession of both rational and physical signs throughout it, will alone guide the observer aright. The actual existing phenomena derive the chief part of their value, in forming a diagnosis, from a recognition of those which preceded them. Dr. STOKES states that abscess occurs more frequently in the lower than in the upper lobes, and that he has met with instances of its cure by cicatrisation. It may result from localised phlegmonous inflammation, or from the extensive and complete solidification above described. I have seen it chiefly after phlebitis, injuries, wounds, and operations, and in connection with erysipelas; but in these the inflammation or solidification around the abscess, of which there were often several, was neither intense nor extensive.

36. Without reference to those purulent collections in the lungs which result from venous absorption, Dr. STOKES has seen acute pneumonic abscess under *three forms*:—1st. As an encysted abscess, with all the characters of true phlegmon: — 2d. As purulent cavities communicating with the bronchi, and without any cyst, the walls of the abscess being formed of the solidified lung: — 3d. The abscess is seated under the pleura, and external to the pulmonary tissue, dissecting the latter from the former, so as to show the structure of the lung.

37. *b. Gangrene* is another contingent result of inflammation of the lungs. It is rarely observed unconnected with suppuration; but it may be rapidly caused by the inhalation of noxious gases, which may so impair the vitality of portions of the lungs as to favour the occurrence of gangrene before the suppurative stage can be developed. In other cases, it has not been determined whether or not this change depends upon the intensity and suddenness of the congestion, or upon the cachectic state of the patient — most probably upon both. It has also been attributed to inflammation of a principal vessel supplying one or more lobules. In the interesting cases adduced by Dr. STOKES, the patients were long addicted to the use of spirits, a cause which operates upon the vascular system in a more direct manner than has been generally supposed; and likewise in all were evidence of extreme congestion, and typhoid, or, more correctly, asthenic pneumonia.

38. *c. The state of the Tissues* adjoining the vascular plexus of the pulmonic parenchyma is deserving some notice. Dr. WILLIAMS states that the interlobular cellular texture is sometimes red, and sometimes singularly free from redness, or partakes of it in a much less degree. In the latter case, the hepatised lung presents somewhat of a marbled appearance. The interlobular septa retain their cohesion, and in more chronic cases are thicker and denser than usual. The mucous membrane of the large and middle-sized bronchi is generally more or less inflamed, presenting the same striated appearances seen in acute bronchitis. The smaller bronchi is commonly of a deeper red than in that disease. The bronchi in the inflamed part often partakes of the softening of the parenchyma. In some instances they are plugged up with an albuminous exudation; but this arises from the extension or association of inflammation of one series of tissues to that intimately connected with it. More commonly the air-tubes, as far as they can be traced, contain more or less of the rusty mucus or muco-puriform matter which has been expectorated. The pleura is very frequently inflamed. It may, however, be free from redness, or from lymph or liquid effusion, even when covering a hepatised portion of lungs (§ 30.).

39. iii. DIAGNOSIS OF SIMPLE PNEUMONITIS. — *A. By the aid of certain rational Symptoms.* — There is hardly one of the symptoms described above that may not be present in other diseases, or be absent in pneumonia. When it is considered that pneumonitis is associated, in the very great majority of cases, either with pleuritis or with bronchitis, or with both; that it may be consequent upon, as well as give rise to either, it becomes the more difficult to determine what are the phenomena which distinguish the simpler states of the disease. Generally, local symptoms, especially fulness, soreness, oppression, or uneasiness in some part of the chest, smallness and increased frequency of pulse, are complained of before chills or rigors occur, and before the constitutional symptoms are fully developed.

40. *a.* The *cough* in pneumonia varies remarkably. It is often slight, short, and occasional, and not such as gives much uneasiness to the patient. In other cases, particularly where the bronchi are affected, and in proportion to the extent of their affection, the cough is severe; at first dry, and subsequently attended by expectoration. If the pleura be at all affected, the cough is generally short, suppressed, sometimes infrequent, but it varies much according to the extension and amount of disease. The cough presents more diversified and more prominent features in the complications of pneumonia than in the simple disease.

41. *b.* The *expectoration* may furnish very decided evidence of pneumonia in some cases, whilst in others it can in no way assist the diagnosis. In *children* especially, amongst whom pneumonia is a most frequent and dangerous malady, the expectoration furnishes no diagnostic aid. The viscid,

muco-puriform, and sanguinolent character of the sputum, although observed in many cases, is by no means constant. The disease may present all the kinds of expectoration, particularly during its early stages, and it may be even unattended by any until its most advanced stages, or until shortly before a fatal issue. The *rusty sputum* is generally found in the most acute cases, and in robust persons; but, in feeble constitutions, or where the disease occurs as a complication of, or during convalescence from, continued or exanthematous fevers, it is not often observed: indeed, in these circumstances, the sputum furnishes comparatively little information, or it may be altogether wanting or very scanty. Although it is generally true that the viscid and red sputum occurs only at the height of the disease, yet it may continue for some days after the subsidence of the more acute symptoms, or even after all signs of pneumonia have disappeared. Instances of this latter occurrence have been furnished by ANDRAL and STOKES, but in these cases it is evident that the inflammation continued to proceed in the bronchi, after that of the parenchyma of the lungs had subsided.

42. In the suppurative stages the sputum assumes a more characteristic form than in the preceding, and is either a purplish red muco-puriform fluid, or a homogeneous purulent matter of a light yellow colour, and of the consistence of cream. These kinds of expectoration occur only in the far advanced or suppurative stage — of interstitial suppuration and softening (§ 34.). Dr. STOKES remarks that there are no differences in the local changes between the cases with prune-juice-like sputum, and those in which there is a secretion of healthy pus; but he admits, with all other observing physicians, that in the former the disease exists in a lower, or more asthenic type, or in broken-down constitutions, whilst the latter is seen in the more sthenic cases, occurring in young or robust persons.

43. In *pulmonic abscess*, and as long as the matter continues pent up, or before it has found its way into the bronchi, the sputum presents no characteristic appearances. In many cases nothing is expectorated but a little mucus; whilst in others it is muco-puriform, as in chronic bronchitis, and either devoid of smell or more or less fœtid. If, however, an abscess form and burst into the bronchi, the expectoration becomes suddenly abundant, and distinctly puriform.

44. *Gangrene* is attended by an expectoration of a dirty greenish, or brownish or sanious matter, mixed with a muco-puriform matter; the whole being of a putrid and very offensive odour, and occasionally mixed with sloughy portions of tissue.

45. As the powers of life sink, the expectoration in the advanced stages becomes scanty, or is altogether suppressed. The suppression, however, does not proceed from any diminution of the secretion, but from the failure of the respiratory acts, and of the vital manifestations of the organ, both of which are insufficient to procure its expulsion. Thus in fatal cases the mucous rhonchus increases and extends as death approaches, until the accumulated secretion mounts to the large bronchi and trachea, when the rhonchus becomes tracheal, and assumes the character to which the appellation *death-rattle* has been given.

46. *c. Dyspnœa*, as remarked above (§ 14.), is more urgent in bronchitis, or even in pleuritis, than in pure pneumonia; and, generally, the amount of dyspnœa indicates in some measure the extent to which the latter is associated with the former, particularly with bronchitis. However, extensive or double pneumonia will increase the dyspnœa, but it will increase the frequency and shortness of respiration more than any actual sense of difficulty. This latter often depends more upon an attendant irritation or spasm of the bronchi than upon actual inflammation of them.

47. *d. Pain* is often but little felt. Uneasy sensation is generally present; but it seldom amounts to pain, unless the pleura becomes implicated in some way or another. The mere tension of this membrane consequent upon inflammatory turgescence of the parts underneath can hardly develop this symptom to any permanent or marked degree. In the last stage of the disease, the functions of the lungs, or arterialisation of the blood, is interfered with, but not so early or so rapidly as in bronchitis, unless when associated with it — an association which will often mask pneumonitis without the aid of physical diagnosis.

48. *B. The physical Diagnosis of Pneumonia.* — It is chiefly upon the *physical signs* that reliance is to be placed in determining the existence of pneumonitis. Dr. STOKES has enumerated the following as the most important relations of these signs: — 1st. Evidences of a local excitation; — 2d. Proofs of sanguineous congestion; — 3d. Evidences of a diminished quantity of air in the affected lung; — 4th. Signs of increased solidity of the lung; — 5th. Phenomena of the voice; — 6th. Phenomena referrible to the circulating system; — 7th. Evidence of accompanying lesion of the pleura; — 8th. The diminished volume of the lung.

49. *a.* In the *first stage* of pneumonia, or that of inflammatory irritation (§ 27.), the physical signs have not been observed with due precision. Dr. STOKES believes that it may be inferred, by the occurrence of a local puerility of respiration, combined with an excitement of the respiratory system. It is evident that this sign, namely, an unusually loud sound of respiration, in a part of the lung, in connection with inflammation of it, can be present only for a short time, and often before the patient comes under treatment; and that its chief value is in connection with disorder of the respiratory and circulating actions, and with the succeeding phenomena.

50. *b.* In the *second*, or LAENNEC's *first, stage* (§ 29.), the crepitating rhonchus, and the gradually diminishing vesicular murmur, are the characteristic signs. Still these signs derive their value chiefly from their combination, and partly from the accompanying, the preceding, and the consequent phenomena.

51. *Crepitation*, which has been most accurately compared by Dr. WILLIAMS to the sound produced by rubbing a lock of hair close to the ear, is not so invariable and positive a sign of pneumonia as LAENNEC supposed. It is to be relied on only when attended by increasing dulness, and by the gradual cessation of the respiratory murmur. If the disease be so extensive as to impede greatly the functions of the lungs, the

energy and frequency of the respiratory movements will be increased, and the respiratory murmur in the sound side may be thereby rendered louder than usual. The increasing density of the congested and inflamed lung will deaden the sound emitted by percussion, so that the affected side will give out a sound somewhat duller than that of the opposite side; although not so dull as will be emitted at a more advanced stage, as there is sufficient air still contained in the affected lung to prevent complete dulness on percussion. The increasing density of the diseased lung renders it also a better conductor of sound; so that during this stage of extensive pneumonitis, and whilst crepitation is still present, some degree of the bronchial respiration and vocal resonance, present in the following stage, may be heard.

52. *c.* In the *third stage* (§ 30.), the cells being obliterated, crepitation and vesicular respiration cease; and, as the large tubes remain pervious, "dulness of sound, bronchial respiration, and a loud resonance of the voice are produced; and *within certain limits*, the extension or intensity of these signs furnishes an accurate measure of the extent or intensity of the disease." The bronchial respiration requires for its production not only increased density of the lung, but also a certain expansion of the side during respiration; for when the whole lung becomes solid, the side is fixed, and the bronchial respiration ceases. In this latter case, the signs are universal dulness, absence of respiration, and resonance of the voice. If, however, the upper portion begins to resolve, or even if an abscess be formed, in either of which cases the bronchial tubes admit again a portion of air, the bronchial respiration returns; it not being necessary that the permeable portion of lung should be of great extent to reproduce this state of respiration.

53. In cases of universal solidification of a lung, the disease may be confounded with extensive empyema, if the history of the case and succession of the signs be not attended to; but there are generally the signs of visceral displacement attending the latter, with absence of vocal vibration or fremitus, characterising solidification of the lung. When this change is complete, particularly in the central parts of the organ, the voice may be heard over a considerable space in the mammary, axillary, and scapular regions. The bronchophony, or vocal resonance of the tubes, may be so loud as to be mistaken for the pectoriloquy of a cavity; but it is distinguished from this latter by its diffusion over a large space, and by its being much diminished by using the stethoscope with its stopper. Dulness on percussion is generally complete when a whole lung is hepatised; but still it is seldom so uniform and general in the lower and middle portions of the chest as in cases of pleuritic effusion; for some of the lobules still continue to retain air, and the large tubes furnish some degree of resonance in the parts nearest to them. In proportion as the lung is solidified, so does it become inexpansible, and the corresponding parietes of the chest motionless, without their being distended or contracted, and without displacement of adjoining viscera or fullness of the intercostal spaces. When the left lung is solidified, it transmits the sounds and impulse of the heart to an unusually wide extent.

54. In the usual sthenic pneumonia, dulness of sound and bronchial respiration are preceded by crepitation; but in some cases of asthenic pneumonia solidification takes place so rapidly as not to be preceded by these signs, in a very appreciable form, or for a time sufficient to admit of their detection. In these cases the disease proceeds with great rapidity, and it becomes difficult to distinguish it from pleuritic effusion, unless the phenomena above alluded to be carefully observed; namely, the absence of displacement of viscera, and of fulness of the intercostal muscles, the resonance of the voice, the greater frequency of bronchial respiration, and the occasional occurrence of a rhonchus in parts of the chest. The disease rarely proves fatal in this stage, unless it be extensive, and both lungs are more or less affected.

55. *d.* In the *fourth stage*, or that of *suppurative infiltration* (§ 34.) the physical signs are not materially altered until the effused matter accumulates in the bronchi so as to occasion a sharp and peculiar muco-crepitating rhonchus, the bronchial respiration still continuing, and the dulness of sound on percussion increasing; but these phenomena should be viewed in connection with the previous history and existing state of the case. When, however, this peculiar rhonchus occurs in the circumstances described, and is connected with signs indicating an extension of disease in the lungs, it may be considered as truly the result of suppurative infiltration of the lung. Still there are some cases in which this stage may be with more certainty inferred from the duration of the disease and from the rational symptoms than from the physical signs; in it the prune-juice expectoration sometimes occurs, or the purulent sputum; but either may be absent, and little or nothing may be expectorated excepting a mucous or muco-puriform fluid from the larger bronchi, and that only in small quantity. In this stage, however, the attendant fever assumes an adynamic form; and rigors, followed by sweats; a small, quick, weak pulse; a short, frequent respiration, with a sense of want of breath; a pallid, waxy countenance, with incipient lividity of the lips, anxiety, low delirium, &c., indicate the local extent of lesion, and the consequent effect produced by it upon the pulmonary functions, and the vital manifestations generally. It is chiefly in this stage, particularly when the disease is limited, that a fatal issue takes place.

56. When an *abscess* forms in this stage, a favourable result may take place nevertheless, and even more frequently than in the state of suppurative infiltration just noticed, inasmuch as the former change indicates more sthenic action and greater constitutional energy than characterise the latter. The signs of abscess are nearly the same as those of a tuberculous cavity communicating with a bronchus. The diagnosis is to be inferred chiefly from the history of the case, a cavity from tuberculous excavation being of much slower progress, and preceded by much less acute symptoms, than that from abscess. Nor is it attended by so great an extent of dulness as is observed in pneumonia. A cavity from an abscess occurs most frequently at the inferior portion, or about the root of the lung; and, owing to the quantity of fluid contained in it, upon its first communication with a bronchus, it gives rise,

at that time, to gurgling or bubbling sound upon a deep inspiration or coughing; and in some cases there is a putrid or fœtid odour with the expectoration and breath of the patient, but chiefly when some degree of gangrene occurs or accompanies the abscess.

57. *e.* As to the *more circumstantial diagnosis* of true pneumonitis, it may be noticed that crepitation heard throughout the greater part or the whole of a lung shows extensive disease; if it be heard at the apex or root of the lung, or in the infra-clavicular and scapular regions, it evinces a more intense form of disease than if it were seated in the middle or lower lobes. The extension of crepitation to parts not previously affected by it shows the increase of inflammation; its cessation, and the substitution of bronchial respiration and perfect dulness on percussion, are proofs of solidification; and the return of crepitation and resonance, where they had been replaced by bronchial respiration and dulness, indicates absorption of the effused lymph and the admission of air into the cells, and consequently a progress towards recovery; but a change from complete dulness and bronchial respiration to clearness and return of the respiratory murmur, without any crepitus of resolution, may take place; and when this sound is heard, it is of a looser and less even character than before — a sub-crepitation merely. If solidification have advanced far and approached to suppurative infiltration, the restoration of the natural structure of the lung becomes proportionately difficult and prolonged to the extent of lesion. The cure may be eventually complete, but more frequently permanent alteration is produced, more especially obliteration of some of the cells and small bronchi, and dilatation of others. *Bronchophony* is most evident when dulness on percussion and bronchial respiration coexist, and it is always most evident in the superior and posterior parts of the chest. It is readily distinguished from pectoriloquy by its greater extent, and by the absence of gurgling or cavernous respiration. It sometimes approaches the ægophonic character, when the pneumonia has passed into the fourth stage, and when resolution from the third is taking place.

58. When pneumonitis is limited to a central or deep-seated part, especially near the base, of the lung, without extending to the surface, the physical signs may be very obscure, and the rational symptoms thus become more important. When the inflammation is very circumscribed, even although it may affect a more superficial portion of the lung, it is detected by the physical signs with some difficulty, particularly when it is seated in the posterior and lateral parts of the organ.

59. *f.* Pneumonia may be distinguished from *bronchitis* by the crepitation being finer and more equal than that of the latter; by the blood-streaked or rusty appearance of the sputa; by the dulness on percussion as the disease proceeds, and the bronchophony and bronchial respiration. In pneumonia, also, the skin is hotter and less livid than in severe bronchitis; whilst the cough and dyspnœa are generally less urgent, and the former less paroxysmal.

60. *g.* From *pleurisy* pneumonia is to be distinguished, in the first stage, chiefly by the crepitation and sputa; and in the second and third stages, by the bronchophony and vocal vibration sensible to the hand; by the absence of the signs of displacement of the adjoining organs and of bulging of the walls of the chest; and by change of posture causing no alteration of the sound on percussion.

61. *h.* Pneumonia is sometimes not readily distinguished from the *hæmorrhagic congestion*, or from *pulmonary apoplexy*, with both which, however, as will be noticed hereafter, pneumonia is occasionally associated. It is chiefly the presence of febrile symptoms, the character of the sputum, the absence of any real hæmorrhage, the existence of crepitation, the progressive dulness on percussion, and the course of the disease, which distinguish pneumonia from these.

62. iv. VARIETIES AND COMPLICATIONS OF PNEUMONIA. — *A. Asthenic Pneumonitis,* — *Congestive Pneumonia,* — *Typhoid Pneumonia,* of various authors; — *Nervous pneumonia* of others. — In this variety of the disease, the inflammatory action assumes an asthenic form, and the attendant fever the adynamic type, owing either to original weakness of conformation, to exhaustion, or a cachectic habit of body, or to the nature of the exciting causes. Hence it is met with chiefly in persons who are weakened by exhausting influences, by insufficient or unwholesome food, or by residence in unwholesome localities and in an impure air. Owing to these circumstances, and to certain associated disorders, it has received from modern authors not only the names mentioned above, but also those of *malignant, putrid, erysipelatous,* or *bilious pneumonia.*

63. The general *character* of this form of the disease is its occurrence during previous disorder or ill-health—during a general morbid condition; in a more or less latent form, and with marked prostration of the vital energies. When pneumonia appears in the course of, or in connection with, continued or adynamic fever, influenza, erysipelas, diffuse inflammation of the cellular tissue, or phlebitis, it always assumes this form. In these circumstances, however, it appears more frequently complicated either with bronchitis or with pleuritis, or with both, than as a simple disease.

64. *a.* The *rational symptoms* of this state of pneumonia are rarely well marked. There are generally, however, a dusky hue of the countenance, slight dyspnœa, quick and short respiration, slight cough, either with or without expectoration; oppression or weight at the chest, but rarely pain, although the disease may be most extensive and dangerous, or even extend to the pleura. The constitutional affection is severe. The pulse is rapid, weak, and small. The skin is hot and dry, or covered with a clammy sweat, particularly at the extremities; the tongue is furred and brown; the bowels are costive, and the evacuations offensive; the urine high-coloured, turbid, scanty, sometimes ammoniacal; and, as the disease proceeds, low muttering delirium, coma, lividity of the lips, cold clammy extremities, &c., supervene, and the patient sinks from interruption to the functions of the lungs.

65. In this form of pneumonia the inflammatory action is characterised by the asthenic or diffusive characters pointed out in the article INFLAMMATION (§. 54, *et seq.*), and it possesses many of the characters of active congestion. When it occurs

during continued fevers, particularly at a far advanced period of their course, it generally affects the posterior parts of the organ, and extends to both lungs. In the cachectic, and in most other complications, it is similarly extensive. The parts affected are not only engorged or hepatised, but also soft and friable, readily breaking down on pressure or exuding a dark grumous blood. The hepatisation, however, is seldom as complete as it is in the sthenic form of the disease; but is irregularly disseminated or extended through the posterior and central parts of the organ, or in points only, with marks of softening approximating the suppurative infiltration of the fourth stage, already noticed, and with films of lymph exuded upon the pleura. This partial or incomplete state of hepatisation may, however, occur in any part of the lung, but is more diffused or extended than in the sthenic form; and although one lung is generally more affected than the other, it is much less frequently limited to one lung only than in that form. It is commonly also much more rapid in its progress; and, particularly when complicated, has often advanced to an irremediable state before it has been detected.

66. *b.* The *physical signs* of this form of pneumonia are more deceptive than in the preceding. For as both lungs are generally affected, and as the disease occurs in previously debilitated or diseased persons, the patient lies on his back, either altogether in the supine posture or with his head and shoulders much elevated — this latter position being usually preserved when the bronchi are also much affected. This posture favours the congestion of the more depending portions and the inflammatory reaction in these parts, whilst the anterior, or more elevated portion of the organ, remains comparatively unaffected. Hence, the anterior parts of the chest do not evince the extent of existing mischief. In this situation but little dulness on percussion is detected, and the breathing is often distinct, although attended by sibilant or sonorous rhonchi. In the posterior, and in some degree in the lateral portions of the chest, dulness on percussion, and absence of the respiratory murmur, are always found, occasionally with a whiffing or sibillous sound. As Dr. STOKES has shown, crepitation does not always attend the early stage of this form of pneumonia, or if it occur it is of very short duration, the structural change of the part causing obstruction to the passage of air through it soon becoming complete.

67. *c.* The *terminations* of asthenic pneumonitis are: — 1st. In recovery, or restoration of the healthy state of the organ. This is, however, much less frequent than in the sthenic form; and, although the disease is formed and progresses with rapidity, its resolution is remarkably slow compared with that form; chronic hepatisation, with low hectic, or latent or more manifest congestion, continuing for several weeks. Recovery even from these states may take place under proper treatment; but, more frequently, atrophy of the lung, with or without ulceration, or other fatal changes supervene. — 2d. Fatal hepatisation or splenification — irregular, diffused, or incomplete, but more or less extensive in both lungs — takes place more frequently than any other lesion, and with great rapidity, and arrests the pulmonary functions. — 3d. A sloughing or gangrenous abscess sometimes forms, and generally destroys the patient in a very short period. — 4th. Chronic solidification of portions of the lung occasionally occurs, and commonly passes into a tubercular state.

68. Dr. STOKES observes that months may elapse before the respiratory murmur is restored, and in many cases it is never completely re-established; and, even when recovery takes place, the contraction of the chest, which usually is observed, shows the slowness with which the disease is removed. However, a more rapid recovery may occur when an acute disease of another and distant organ supervenes.

69. *B. Complications of Pneumonia.* These are more common than its pure or unassociated form, and are met with in both the sthenic and asthenic types of the disease; the latter, however, more generally presenting the complicated state. — *a. The association of bronchitis with pneumonia* — *broncho-pneumonitis* — is most common. Indeed, from what has been advanced above (§ 5.), it will appear evident that pneumonia, especially its most asthenic form, can hardly exist without the small bronchi becoming more or less implicated. It is, however, when the disease extends to the larger branches that this complication should be considered as existing. It is sometimes material to mark the procession of morbid phenomena in order to ascertain the primary affection. In the great majority of instances, the bronchi are primarily affected, the morbid action extending thence to the parenchyma of the lungs, owing either to the nature of the causes, to the constitution and existing state of the patient, or to the treatment adopted at the commencement. I have observed, in numerous cases, particularly among the children of the poor, living in low, damp, and close situations and rooms, sleeping in over-crowded apartments, and insufficiently or unwholesomely fed and clothed, that the disease has commenced in the bronchi, extended to the air-cells and substance of the lungs, and thence to the pleura, with great rapidity. In this complication the quantity of mucus in the bronchi may mask the crepitation of pneumonia. Still crepitation will generally be heard in the inferior and posterior regions of the chest, whilst the mucous rhonchi will be evident in the more superior parts. The rusty or tinged appearance of the sputa, as the disease proceeds, the dulness on percussion, the increased dyspnœa, the greater severity and more paroxysmal character of the cough, will also mark this association.

70. Broncho-pneumonia very frequently supervenes in the course of *influenza*. It was common, and fatal in the influenza of 1837, particularly when it implicated, as it very often did, both lungs. In this epidemic the pulmonary affection generally assumed the asthenic form, the pulse being weak, quick, and small, the cough being severe, puriform expectoration abundant, and dyspnœa distressing; and in proportion to the vital depression the most energetic means were required to rouse the vital resistance to the extension and fatal tendency of the disease. Broncho-pneumonitis is also frequent in the course of *hooping-cough*, and in the more unfavourable forms of *croup*; but, in these, it assumes a more sthenic character than in influenza. It also occurs in the course of *cardiac disease*, particularly when the valves are affected, and in connection with *hæmoptysis*; but, in these circumstances, it presents much of the congestive form.

71. The bronchitis which so very generally complicates *measles* passes very frequently into broncho-pneumonia, although the pneumonia may be the chief affection. In all cases of this association, the pulmonary disease partakes of the constitutional malady, being sthenic, asthenic, or malignant, as this latter may be. When the local disease is severe, it is readily recognised, as it is commonly attended by an imperfect evolution of the eruption, or it follows immediately upon either the premature or the regular disappearance of it; the fever or constitutional disturbance being unabated or increased.

72. The *peripneumonia notha* of several writers was frequently a broncho-pneumonia occurring in aged, cachectic, or debilitated persons, in whom the disease assumed, from these circumstances, more or less of an asthenic form, and extended to both lungs; but the same term was often also applied to other states of bronchitis, and even to asthenic pneumonia, with extension of disease to the pulmonary pleura.

73. *b. Pleuro-pneumonia — Pleuro-pneumonitis — Peripneumonia — Peripneumony* — or the association of inflammation of the substance of the lungs with that of its investing pleura, very frequently takes place. The supervention of pleuritis upon pneumonitis, or the coëtaneous occurrence of both, is attended by additional changes and phenomena to those mentioned above. Several of the alterations and symptoms described in the article PLEURA are observed when the inflammation implicates the serous membrane; but when the substance of the lungs has been for some time, or is extensively affected before the pleura is invaded, this latter is very rarely so remarkably altered as in primary pleuritis, and effusion of lymph, especially from it, very rarely takes place to so great an extent. M. LAENNEC has shown that when the inflammation has been nearly equally severe in the substance of the lung and in the pleura, the effusion from the pleura, by its pressure, modifies the effects of the inflammation in the lung; this latter being often found after death more consolidated, and tougher and redder, than in ordinary hepatisation, and devoid of the granular texture. Its resemblance in such cases to the muscular substance induced M. LAENNEC to call this state that of *carnification*. In this complication, the effusion of lymph into the air-cells is probably prevented; hence the granular appearance is not produced, the lymph being effused external to the cells, or in the connecting cellular tissue. In many, at least, of these cases, wherein the carnification is most complete, I believe that the inflammation originates in the pleura, or in its subjacent cellular tissue, and extends through the medium of this latter tissue to the subjacent structure of the lung; and this is rendered the more probable by the amount of effusion, which is generally great where the carnification is complete. In such cases the progress of inflammation is much less rapid, and the lesion of the lung rarely proceeds so far as the *fourth* stage, or that of suppurative infiltration or softening. If the pleura is covered with a false membrane, the contraction and solidification of this, as the disease continues or becomes chronic, binds down and compresses the subjacent pulmonic structure, rendering it still more dense, and obliterating, more or less permanently, the air-cells of the part. The consequence of this change is, as somewhat too strongly insisted upon by Dr. WILLIAMS, that the chest remains to a certain degree contracted, as after pleurisy, when the liquid effusion is removed by absorption; the obliterated air-cells no longer admitting the air. But in some of these cases the lymph obstructing the cells is gradually absorbed, and the parts are partially restored to their former state. When, however, such restoration is not effected, the air not reaching the cells often dilates the bronchi, this dilatation taking place in various grades; dilatation of the bronchi thus following pleuro-pneumony in its more chronic states.

74. As respects the *pleura* in these cases, the changes which take place consist chiefly — 1st. Of effusion of lymph; — 2d. Of effusion of a sero-puriform fluid; — and 3d. Of the effusion of air, or gaseous fluid. The *first* is almost constant, although it may occur to a very slight extent, when the substance of the lung is extensively, deeply, and primarily affected. The *second* is comparatively rare in pleuro-pneumonia; and the *third* is very rare indeed, although it may take place in this complication of pneumonia, as in primary pleuritis, especially in the more asthenic cases.

75. The *symptoms* of pleuro-pneumonia are not materially different from those of simple pneumonia, unless much effusion takes place from the affected pleura. When this membrane is consecutively or slightly affected, pain may not be severely felt. Indeed this complication is generally not so severe or acute as either simple pneumonitis or primary pleuritis; and the symptoms are very often more obscure than those of either. When lymph is effused on the pleura, it does not necessarily induce corresponding physical signs; hence the *frottement* of LAENNEC is not a common sign of pleuro-pneumonia, and is rarely observed in the advanced stages, or at the resolution of the disease. It is observed chiefly in the early stages of some cases of extensive pleuro-pneumonia. At first, crepitation may be heard; but it becomes indistinct as effusion from the pleura takes place and is considerable. Dulness on percussion is greater than in pneumonia, especially in the lower parts of the affected side. As Dr. WILLIAMS states, bronchial respiration and bronchophony are soon produced, in the central regions of the chest, by the condensed lung being pushed against the walls; and if a thin layer of liquid intervene, the bronchophony acquires a buzzing accompaniment, the sound seeming to consist of two voices; this probably arising from the vibrations being modified into a buzzing or bleating by passing through the thin layer of liquid. The vocal resonance is generally louder in pleuro-pneumonia than in either simple pneumonia or pleurisy, owing to the greater condensation of the vesicular structure, and to the closer application of the inflamed lung to the walls of the chest — circumstances also which explain the occasional appearance of the tracheal or amphoric sound on percussion in the mammary region, whilst other parts are dull. In cases inefficiently treated at their commencement, and become chronic, solidification of a portion of the lung having become permanent, and the fluid effused from the surface of the pleura having been in great measure absorbed, respiration is often quite tracheal in this

region, and resonance of the voice as loud as that of cavities, especially if dilatation of the bronchi have taken place, as frequently occurs, in these circumstances.

76. *c.* During the course of *tubercular disease* of the lungs pneumonia often occurs; and is either partial or limited, or more less extended, especially in one lung. Inattention to this fact, and the consequent non-detection of the superinduced inflammation, in such cases, are often the causes of their more rapidly unfavourable termination. Either simple pneumonitis, or pleuro-pneumonitis, or even still more frequently broncho-pneumonitis, may thus supervene; and the great frequency of their occurrence should induce the physician to watch for them, and to combat them on their first appearance.

77. *d.* When treating of *hæmorrhage from the lungs* (§ 114.), I remarked upon the frequent connection of this pathological condition with inflammation of some portion of the organ. It is not unusual for active congestion of the lungs to give rise to slight or even copious hæmorrhage, and then pass on either to simple pneumonia, or to broncho-pneumonia. Generally this occurrence is connected with tubercles, this latter being the primary malady; but, in many, the consequent inflammation is more immediately dependent upon the hæmorrhage and congestion than upon the tubercular disease; and this is more especially the case when hæmorrhage takes place in the form of pulmonary apoplexy. Whenever, therefore, hæmoptysis occurs, partial or more general pneumonia or broncho-pneumonia should be suspected, and its existence or non-existence ascertained by a careful examination.

78. *e.* The *absorption of puriform or other morbid secretions* into the blood, and *phlebitis* occurring either after parturition, or after surgical operations or injuries or wounds, are not infrequent causes of pneumonia of a peculiar, insidious, and latent kind, which sometimes does not manifest itself until shortly before death; and then chiefly by oppressed, quick, and short breathing, and mucous rattle. In some of these cases, portions only of the lungs are found inflamed in the first and second stages; in others, there are numerous circumscribed hepatisations, varying somewhat in their characters; and in several, purulent deposits are met with in the parenchyma of the organ; these deposits being circumscribed, and the tissue surrounding them either inflamed or almost healthy. These are, however, to be viewed as infiltrations of puriform or other morbid secretions into the pulmonary tissue, inducing asthenic inflammatory action in the parts with which they come in contact and contaminate; and, perhaps, in some situations, as asthenic inflammation of the more extreme capillaries through which these secretions circulate, the capillaries of mucous and cellular parts being most prone to be affected by them. Those small abscesses, or deposits, which are more obviously instances of puriform infiltration, present the matter in contact with, and infiltrating the margins of, the surrounding tissue, which is hardly or not at all inflamed; whilst those which are manifestly connected with inflammatory action present a red or livid margin, with a more or less distinct coat of lymph in some instances, but only in those in which this action approached the nearest to the sthenic form. These consecutive abscesses or deposits are more particularly noticed in the art. ABSCESS (§ 27. *et seq.*) and LIVER (§ 208. *et seq.*).

79. *f. A complicated and congestive form of Pneumonia* — complicated most frequently with bronchitis — is often consequent upon eruptive fevers, upon cholera asphyxia, or pestilential cholera, and upon asphyxia from whatever cause, and especially when produced by foul exhalations. It sometimes also occurs in the course of continued endemic, remittent, and intermittent fevers. In all these circumstances, the pneumonia is generally more or less asthenic and obscure, or even latent, sometimes not manifesting itself until shortly before death, or before the lungs had become extensively impervious to the air, or even not until it is detected after death.

80. v. CAUSES OF PNEUMONIA.—Inflammation of the substance of the lungs, in some one of its forms or states — in a sthenic, asthenic, congestive, malignant, or complicated form, according to the nature and association of the exciting causes, and the state of constitution and predisposition of the individual — is a frequent disease, especially in cold and temperate or variable climates. — *A. Childhood* and far advanced *age*; the sanguine temperament, and the weak or scrofulous diathesis, are most *predisposed* to pneumonia. *Infants* and *children* * are especially predisposed to this disease, which, in its several forms and complications, destroys more of them than all other inflammatory diseases. Debility from whatever cause, whether original or from previous disease, remarkably predisposes to pneumonitis. The eruptive fevers, especially measles, hooping-cough, and previous attacks of either pneumonia, bronchitis, or pleuritis, exert a similar influence, as I have shown under these heads. The greater disposition of pneumonia to occur during *gastric* and *bilious* disorder, especially at certain seasons, as the autumnal, and in cachectic states of the frame, have induced some authors to notice varieties of pneumonia by these appellations. But these are not varieties, but merely contingent associations of the disease with, or appearances of it during, these states of previous disorder.

81. *B.* Cold, or whatever favours or produces congestion of the lungs, *excites* an attack of pneumonia; and the readiness with which it operates is generally in proportion to the susceptibility and excitability of the individual, and to the impairment of vital resistance. If exposure to cold be so long continued, or if the degree of cold be so great, relatively to the state of vital energy and resistance, as to cause vital depression and congestion of the lungs, reaction will generally follow, unless the depression be so great as to overcome or altogether annihilate the powers of vital

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* The remarkable *prevalence* and *fatality of pneumonia among infants and children* are shown by the returns to the Registrar General.

1. In *Manchester*, in 1839, of 501 deaths from pneumonia, 213 were infants in the first year, 156 in the second year, and 44 in the third year of age.
2. In *Liverpool*, of 657 deaths from pneumonia in 1839, 216 were infants in the first year, 212 in the second year, and 68 in the third year of age.
3. In *Birmingham*, of 395 deaths from pneumonia in 1839, 160 were in the first year, 136 in the second year, and 26 in the third year of age.

In persons far advanced in age, asthenic and complicated pneumonia becomes somewhat more prevalent than at middle age, and very much more fatal.

resistance and vascular reaction. All noxious agents affect the lungs more severely and certainly when the constitutional powers are weakened, or the spirits depressed, and when the body is in a state of repose or asleep, than in other circumstances; and this is especially the case in respect of the influence of cold. When sufficient exercise can be taken to preserve the circulation in a state of activity, cold is seldom injurious; but as soon as repose or sleep takes place congestion supervenes, particularly in the lungs, and the congestion may go on to asphyxia or vital extinction, if the cause continue to operate or to increase; whilst it may be converted into inflammation if the cause be suddenly removed, or if exciting or other agents be brought into operation, which tend to develope vital reaction. Owing to this and other causes, pneumonia is most frequent in winter, autumn, and spring, and most common in those classes of the community which are most exposed to cold in any form, or to vicissitudes of climate, season, weather, and temperature, especially sailors and soldiers, coachmen and grooms, day-labourers, firemen, &c. It is more prevalent in males than in females, owing to these circumstances; but, according to the returns to the Registrar General, &c., not so much more so than is generally stated, the deaths of males from pneumonia compared with those of females being as 10 to 8.

82. Inhalations of acrid, chemical, and other noxious gases; public speaking, and all exertions of the voice; the use of wind instruments; concussions of the chest; prolonged swimming, or immersion in water; and removal into a very warm air after prolonged exposure to cold, and particularly to atmospheric cold—are powerful exciting causes of the disease. Other maladies not only predispose to, but often excite an attack of simple or complicated pneumonia, but more frequently the latter, in either a sthenic or asthenic form, and either during their progress or upon convalescence from them. This is especially the case in respect of eruptive and continued fevers; of hooping-cough, bronchitis, and pleuritis; of diseases of the heart; and of croup and laryngitis. The greater liability of pneumonia to occur after the disappearance of cutaneous eruptions, or upon the sudden cessation of an attack of gout or of rheumatism, has been noticed by most writers; but much more importance has been attached to this cause than it deserves, for pneumonia is very rarely produced by it.

83. The incautious exposure to cold or wet, and to the night air, after breathing for some time the foul and depressing air of a confined or crowded apartment, or ill-ventilated quarter, bed-room, or barrack-room, is perhaps the most productive cause of pneumonia, particularly in large towns, and in armies and fleets, and explains the greater prevalence and mortality of the disease in these circumstances than in open healthy localities.

84. *C.* The *endemic* and *epidemic* prevalence of pneumonia has been admitted by most writers. — *a.* It is sometimes *endemic* in elevated, cold, and dry localities, either in its simple form, or in connection with pleurisy — as a pleuro-pneumony. It is also prevalent in low, cold, and humid situations, but less so than in the foregoing places, and is most commonly associated with bronchitis — as a broncho-pneumonia. Although pneumonia prevails chiefly in cold countries, yet it is often observed in the more temperate climates of the south of Europe, especially where cold northerly winds blow from high ranges of mountains. In both Milan and Madrid pneumonia is very prevalent. Acerbi states that, in the hospital of the former city, there were 142 cases of it out of 175 patients. It is also said to be prevalent in the vicinity of Vesuvius, probably owing to acrid or otherwise noxious exhalations or gases from that volcano. Mr. Farr has shown, in his tables of mortality, drawn up from the returns made to the Registrar General, that the deaths from pneumonia in *cities* and *large towns* in England are much more numerous than in the same amount of population in *country districts* — are so much so as to indicate both a greater prevalence of the disease, and a greater rate of mortality from it, in the former that in the latter.[*]

85. *b. Epidemic* pneumonia has been described by many authors. As a complication of influenza, pneumonia of an asthenic form, and broncho-pneumonia, may be said to have been epidemic at the commencement of 1837. When this disease is epidemic, it is most frequently asthenic. It is not infrequently also epidemic amongst horses and cattle. Laennec attributed the epidemic occurrence of pneumonia to deleterious miasms in the atmosphere; and others have imputed it to swarms of minute insects in the air — a subject of much importance, and most ably considered by Dr. Holland, in the chapter "On the Hypothesis of Insect Life as a Cause of Disease." (*Medical Notes and Reflections*, p. 560.) Although changes in the temperature, in the hygrometrical state, in the weight or density, and in the electricity of the atmosphere, may account for the increased prevalence and varied forms of this and of many other diseases, still they are insufficient of themselves to cause the more devastating epidemics sometimes observed, and, as respects this disease, most remarkably amongst some of the lower animals. Even when occurring epidemically, situation, weather, and seasons[†]

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[*] 1. The *deaths* from pneumonia, registered in the *metropolis* for 1838 and 1839, were 3954 males and 3477 females — total 7431.

The *deaths* from this disease in about the same amount of population in the *counties* of Cornwall, Devonshire, Dorsetshire, Somersetshire, and Wiltshire, during these two years, were 1888 males and 1558 females — total 3446, or less than one half the deaths from pneumonia in the metropolis.

2. The *deaths* from pneumonia in 1838 and 1839, in *twenty-four town districts*, including the metropolis, were 8188 males and 6874 females — total 15,062.

The *deaths* from this disease in the same two years in *twelve country districts*, containing about the same amount of population as the town districts, were 3392 males and 2826 females — total 6218, or in the proportion of about 3 to 7½.

3. The *deaths* from pneumonia in the *metropolis*, in 1839, were 1949 males and 1738 females — total 3687.

The number of *deaths* in 1839, in *England and Wales*, were 10,000 males and 8151 females — total 18,151.

[†] Number of *deaths* from pneumonia registered in the *metropolis* during the *four quarters* of 1838, 1839, and 1840.

1. During January, February, and March: 271 days — 3326.
2. During April, May, and June: 273 days — 2454.
3. During July, August, and September: 275 days — 1827.
4. During October, November, and December: 275 days — 3600. The greatest number, and nearly double that of the preceding three months, in which the number is least.

From these data, pneumonia appears to be most prematerially influence its characters and prevalence. Thus HUXHAM states, that during an epidemic it assumed more of the bronchitic character in low and humid places, and most of the pleuritic form in dry and elevated situations. (See articles ENDEMIC and EPIDEMIC INFLUENCES.)

86. vi. TERMINATIONS, DURATION, AND PROGNOSIS. — *A.* The chief *Terminations* of pneumonia have been noticed when describing the usual course of the disease. But in addition to these it may be stated, that the supervention of *pleuritis* with very copious effusion may supersede or resolve the inflammation of the substance of the organ, that of the pleura and its consequences becoming the chief or only lesion. This is, however, comparatively rare. Much more frequently the acute attack of pneumonia subsides or is subdued, and the patient continues short-breathed and feverish. The pulse remains quick, and dulness or crepitation is still detected in parts of the chest, with more or less uneasiness. Chronic hepatisation of portions of the lungs thus not infrequently follows neglected or improperly treated pneumonia, or premature exposure or neglect during convalescence, especially amongst soldiers and sailors, or the poor, who are exposed to vicissitudes of weather. It is not improbable that tubercular disease of the lungs may originate in these states of chronic pneumonia, especially after repeated attacks, or exacerbations of the local changes, as supposed by MM. BROUSSAIS and ANDRAL; and when occurring in scrofulous constitutions. It is not unlikely, however, that many of the cases in which the inflammation has been supposed to lapse into the chronic state, and to give rise to tubercles, have been tubercular from the commencement, the pneumonia being merely an intercurrent disease, which has more rapidly developed the tubercular formations; and these have tended to keep up a state of chronic inflammatory action with more or less engorgement or solidification of the lung; for pneumonia very rarely degenerates into a chronic state, unless in connection with tubercles or hæmoptysis, a circumstance which probably induced BOUILLAUD to infer that tubercular formations in the lungs is merely a chronic form of inflammation of them.

87. *B.* The *duration* of pneumonia is very indefinite, and varies with the age of the patient, with the state of vital action characterising the inflammation, with the complications and the treatment adopted. In general the asthenic states are more rapid in their progress than the sthenic; and the complications of the disease with exanthematous or other fevers, or the occurrence of it during early convalescence from these, not only accelerates the progress, but increases the danger from it. Debility and advanced age also accelerate its course. In some instances of its occurrence in these circumstances it may run its course in from thirty-six to forty-eight hours, or even in a somewhat shorter period. M. LAENNEC attempted to assign periods to the different stages of the disease; but these can be viewed as approximations only to the truth, which numerous causes may vary, more particularly the violence of the attack, and the circumstances just adverted to. He states that the average duration of the stage of *engorgement* is from twelve hours to three days; of the stage of *hepatisation* from one to three days; and of the stage of *supperative infiltration* from two to six. Remedies which retard the progress of the disease may, however, prolong the duration of the first two stages beyond the periods here assigned; these varying most remarkably with the treatment and peculiarities of the case: and, as contended for above, the stage previous to hepatisation is more important, and of longer duration, especially in children and young subjects, than M. LAENNEC appears to think.

88. *C.* The *prognosis* is, equally with the duration of the disease, dependent upon numerous circumstances, and more particularly upon those just named (§ 87.). Pneumonia, in all its forms, but more particularly its asthenic and complicated states, and when epidemic, is a very serious malady, requiring a cautious prognosis even in the more favourable cases; for these may superinduce a most dangerous pleuritis, or become otherwise aggravated in their progress; or a relapse of a most dangerous kind may occur during early convalescence from them. The "numerical method" of estimating the danger has been extended to pneumonia as well as to other diseases by several French pathologists, as well as by a few British writers. But it must be obvious, on reflection, that the danger and rate of mortality must necessarily vary with the situation and climate; with the prevailing epidemic; with the age, constitution, and other circumstances of the patient; and with the severity, stage, and complications of the malady. Hence the mortality from this disease has been differently estimated; and, amongst soldiers during service, amongst the poor, the ill-fed and ill-clothed, amongst persons engaged in crowded or over-heated or ill-ventilated factories, and in other unfavourable circumstances, it is generally high. Dr. MANN states, that during the last war in the United States of North America, pneumonia was both very prevalent and very fatal. Sir J. MAC GRIGOR states that the disease was prevalent among the troops in Spain during the last war, and that it often assumed an insidious, latent, or low form. The disease, however, does not appear to have been very violent or fatal; for of 4027 cases entered as pneumonia, only 285 died, or rather less than 1 in 14. The treatment of it appears to have been energetic, early, and judicious. In some of the hospitals in Paris the mortality has varied from two fifths to one tenth. The loss is still greater than the highest of these rates amongst the aged.

89. The danger from an attack of pneumonia is remarkably increased by previous ill health, or attacks of pulmonary disease; by preceding eruptive fevers; and by original debility of constitution. Although recovery may take place from any stage of the disease, the chances diminish rapidly with the supervention of the advanced stages, and become very few after suppurative infiltration takes place. The very rare occurrence of gangrene or abscess is a most dangerous, but not hopeless event. A violent attack, a great extent of the disease, and particularly the implication of both lungs, and its complications with double bronchitis; the affection of the upper lobes and roots

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valent and fatal during the cold and humid weather following the *third* three months of the year. This agrees with my observation in respect of children.

of the organ; the operation of causes of a depressing and contaminating nature, as foul air, and partial asphyxia from foul exhalations; the occurrence of the disease during influenza and eruptive fevers, during the puerperal states, and after prolonged suckling; all the more severe complications noticed above, and the progressive advance of the disease notwithstanding early and judicious treatment,—are extremely unfavourable circumstances.

90. The symptoms more particularly evincing danger are those indicating the progress of the disease to suppurative infiltration of the lungs, or even to extensive hepatisation; very quick and short breathing; frequent dilatations or a working of the alæ nasi; a feeling of a want of breath, rather than of difficulty of breathing; delirium or restlessness; a rusty or prune-juice appearance of the sputa; cold sweats; anxiety, and sharpened pale features, with lividity of the lips and tongue, and the other symptoms noticed above (§§ 21. 55.).

91. vii. TREATMENT.—The treatment of pneumonia should be conducted with strict reference — 1st. To its stages; — 2d. To the states of vital action and power; — and 3d. To the complications and peculiarities of each case. To each of these circumstances the *indications of cure* should be individually appropriate.

92. *A. Treatment of Sthenic Pneumonia.*— *a.* In the *first* and *second stages*, or those of incipient inflammatory action and engorgement — the *first stage* of LAENNEC (§ 49—51.)—the disease may be much shortened, if not altogether arrested, by energetic means. This, therefore, should be the *first* and *chief intention.* — *a.* If, at this period, the local and constitutional symptoms and appearance of the patient indicate sthenic reaction either commencing or established, a large *blood-letting* ought to be immediately practised; and the blood should be abstracted in a full stream, and until a marked impression is made upon the pulse, whilst the patient is in a sitting or semi-recumbent posture, as directed in the article BLOOD (§ 64.): but, for the reasons there stated, and since adopted by the ablest writers and practitioners, it should not be carried so far as to produce full syncope. In the young and robust, and where there is evidence of unimpaired constitutional power, blood-letting may be resorted to as early as any signs of inflammatory action can be detected, if it be performed in the way I have advised. This having been performed with the effect just mentioned, means should be prescribed to prevent the return or increase of the vascular reaction; and with this view I have, for many years, directed, immediately after the blood-letting, from 5 to 15 or 20 grains of calomel, with from 3 to 5 of James's powder, and from 1 to 3 of opium, to be taken at one dose: saline diaphoretics, with antimony, more particularly the liquor ammoniæ acetatis and liq. antimonii tart., in full doses, with the spiritus ætheris nitrici, in camphor-water, being given every three or four hours. In many cases, this prompt and large blood-letting will arrest the further progress of the disease, and in all tend remarkably to shorten it.

93. The patient ought to be seen again in about eight or ten hours, or twelve at the furthest; and if the symptoms are not abated, or if they have become exacerbated, and if vascular reaction from the state to which it had been reduced by the blood-letting have taken place, the pulse having increased in strength, venesection must again be resorted to, if the patient be robust or plethoric, and blood abstracted so as to affect the pulse and system as before, and in the manner already advised, and it should be instantly followed by the exhibition of the same medicines which I have recommended above (§ 92.) after the first bleeding. In many cases, as in the less robust or plethoric, or where the increase or return of the vascular action is slight or hardly manifest, or where there is merely a persistence of the morbid action, either in the same or in a decreasing degree, local depletion by cupping or leeches, or by cupping over the leech-bites, will be adopted with advantage; the amount of local depletion having reference to the circumstances of each case. The chief advantages of this plan, which I have long pursued in this and in other sthenic inflammations, is, that the means employed immediately after a full blood-letting are such as will promote all the effects which it is calculated to produce, and as will prevent a return of the vascular excitement, which is prone to return as long as the local morbid action continues, and even after it is subdued, when the blood-letting has been copious.

94. The practice of prompt and copious vascular depletions, so very generally and long observed in this country, has been recently adopted by M. BOUILLAUD and a few others in France, and with the success which has followed it in this country, although it has been decried by M. LOUIS, who has adduced his " numerical method " in proof of the little benefit produced by it. But, as I have elsewhere contended, this method is a delusion, unsupported by that best of all tests of medical doctrine, common sense; for it must be manifest that if a mode of treatment be empirically followed in all cases said to be nosologically the same, although different or even opposite as respects vital power, complication, and stage of advancement, it must be injurious almost as frequently as beneficial. The quantity of blood abstracted by M. BOUILLAUD is certainly large, but not larger than has usually been taken in this disease by public and private practitioners.

95. It is unprofitable to follow the French physicians in their arguments on this question, as some of our recent philo-Gallic writers have done; as their lucubrations tend only to overlay a plain common-sense view of the subject with a load of flat, stale, and inapplicable numerical — vainly called statistical—details. From what I have advanced it may be inferred, that nothing can be said with propriety as to the precise amount to which blood-letting should be carried in this, more than in any other inflammation. It should be practised so as to make a full impression upon the pulse and system, and with but little reference to the quantity. I have taken as much as fifty-four ounces at one time, in the manner I have advised, from a strong plethoric man, the early stage having been fully developed, and vascular reaction being energetic; and, having had recourse to the additional means above mentioned (§ 92.), no further blood-letting was required. In similar circumstances, I have not infrequently had from forty to fifty ounces taken at the first venesection, and with the same result. In this, as well as in other inflam-

mations, although vascular depletion is the chief remedy, it ought not to be the only one. It should be aided by other means. What these means are I have already partly indicated; but they require to be noticed more in detail, for the chief of them have been individually lauded with all the zeal which partisanship generates, and with all the exclusiveness which a one-sided view or an adopted doctrine never fails to produce.

96. *b. Tartarised antimony* has been long employed in emetic and nauseating doses in the treatment of pneumonia; and, independently of these effects, by Dr. MARRYATT, and more recently by Dr. BALFOUR. RASSORI of Genoa, however, first demonstrated the great extent to which this substance might be prescribed for inflammatory diseases; and LAENNEC more especially elucidated its effects in the treatment of pneumonia, but, in estimating it above blood-letting in this disease, rated it much too highly. He gave this medicine in doses of from one to two and a half grains in three ounces of a sweetened weak infusion of orange leaves, withholding it after the sixth dose, or persevering in it according to the violence of the attack. It was chiefly to this remedy that he attributed the great success of his treatment, which he rated as high as two deaths only in 57 cases — a success, however, which has not been attained by other practitioners, who have used this substance. Since 1819 I have given it an extensive trial in pneumonia, chiefly in dispensary practice; and, although I do not think so highly of its efficacy as LAENNEC, I believe it to be a valuable remedy, but subsidiary only to blood-letting, and appropriate chiefly to the *first stage* of the disease. It is by no means a safe medicine for young *children* or *infants;* for I have seen large doses of it, particularly when too often repeated or continued too long, produce most dangerous and even fatal collapse, which was sometimes mistaken for the unfavourable course of the disease. In this class of patients, therefore, it should be given with caution, and its effects ought to be carefully watched. For adults it may be prescribed, after sufficient blood-letting, in doses of from half a grain to two grains in any agreeable vehicle, and repeated every two, three, four, or five hours, according to the severity of the disease; but I have found it equally beneficial in smaller doses, when conjoined with the other medicines noticed above in connection with it (§ 92.). The first doses usually cause vomiting, which ceases after the second, third, or fourth; and which should be arrested, if it continue after the second or third, by one or two doses of hydrocyanic acid. If it produce purging, a few drops of laudanum, or the syrup of poppies, should be given with it. Tartar emetic, when given in large and repeated doses, operates chiefly upon the organic nervous energy and the vascular action, lowering both, or the latter chiefly through the medium of the former, in a very remarkable manner, when neither of them are much excited; but much less manifestly when either, or both, are greatly increased.

97. *c. Mercury with opium,* in large doses, has been much employed, both with and after blood-letting; and calomel, in doses of from 5 to 20 grains, is the preparation which is most to be preferred. If the bowels have not been sufficiently evacuated, the first dose of it may be given without the opium, with four or five of JAMES's powder, or with one or two of the extract of colchicum, or even with both; but when the bowels are free from fæcal accumulations, from one to three grains of opium should be combined with these, and given immediately after the first blood-letting, as noticed above (§ 92.). The doses of these, and frequency of exhibiting them, should be regulated according to the severity and progress of the attack, and the circumstances of individual cases; but they should be persisted in until the gums are affected, or the disease is arrested. In children very generally, and in adults not infrequently, the disease will be either much mitigated, or altogether arrested, before the effect upon the mouth is produced by the mercury. The application of the mercurial ointment to a blistered surface, and rubbing it on the insides of the thighs and armpits, have been likewise recommended; but the exhibition of calomel internally, particularly with the remedies here advised, is much more efficacious; these remedies accelerating the operation, and securing or promoting the beneficial effects, of the calomel upon the local disease, as well as upon the constitutional disturbances. In some cases, the hydrargyrum cum cretâ may be given, particularly when the bowels are irritable, with opium and ipecacuanha; but it is not so entirely to be depended upon as the calomel.

98. The good effects of calomel, prescribed as now advised, are less immediate than those of tartarised antimony, but more certain and permanent; it should, therefore, be preferred, particularly when the disease is advancing to, or has far advanced in, the stage of hepatisation. It is also a much safer treatment for children than that by antimony in aid of blood-letting; but for them, JAMES's powder or ipecacuanha should be given with it, in preference to other medicines, and opium should be omitted, unless the child is several years of age. The great advantages of this treatment are its influence in lowering local and general vascular excitement; in relaxing the cutaneous surface, and equalising the circulation; in preventing the effusion of lymph, and in promoting the absorption of whatever may have been already effused.

99. *d.* In the early stages of pneumonia, venesection, as above advised, local bleeding according to circumstances, tartar emetic, mercury, &c., are the means which ought to be depended upon. Other remedies may, however, be employed, either in aid of these, or with a view of preventing a return of the inflammation. *Blisters* and other *external derivants* should be employed only after the treatment advised above has been carried sufficiently far, when they will aid in removing existing congestion. *Purgatives* are not of much service; still the biliary and other secretions should be promoted, and the bowels duly evacuated — ends which the means already recommended will seldom fail to accomplish. *Diaphoretics* and *diuretics* should be viewed as adjuvants merely, and are but little required where either the tartar emetic or the mercurial treatment has been prescribed with due activity. Of these medicines, the liquor ammoniæ acetatis, the spiritus æth. nitrici, and ipecacuanha are the most beneficial, and are generally valuable adjuncts to the more energetic means previously mentioned. *Expectorants* are seldom required in

the earlier stages of sthenic pneumonia, not even after the inflammatory action is removed, unless in old persons, or when the treatment has occasioned considerable exhaustion, and is followed by a difficult expectoration. They should be employed with caution, or they may favour a relapse. The decoctum senegæ, camphor, and ipecacuanha, should be preferred; squills and ammoniacum should be prescribed only in small doses. In this stage too much should not be attempted by expectorants. Nature will generally perform her own work the best, when not impatiently driven. If she require aid, the means just named, blisters, or the embrocations hereafter to be noticed (§ 110.), will be sufficient. A recourse to other *sedatives* than the opium, in the manner above advised (§ 97.), is seldom either required or beneficial.

100. *e.* In the *third stage*—the *second* of LAENNEC — when solidification has taken place, or is far advanced or extensive, the chief *intentions* are, to procure the absorption of the effused matter, to remove the attendant engorgement, and prevent the extension of irritation or inflammatory action around the hepatised part. Blood-letting is now no longer of service, unless it has been previously neglected or very insufficiently practised, and the patient is still plethoric; the veins evincing considerable fulness, and the pulse much power. A general or local bleeding, or both, may be cautiously employed in these latter circumstances, particularly if crepitation be still heard in any part of the lung; but the chief dependence should be placed upon *calomel* and *opium*, which may be conjoined with colchicum or JAMES's powder, or with digitalis, according to the peculiarities of the case. When this stage becomes advanced, or has continued for some time, blisters, rubefacient embrocations (§ 110.), and salines, with mild expectorants, digitalis, camphor, &c., according to the state of the pulse and the presence of fever, are often beneficial. In this stage of the disease the decoction of *senega*, in small or moderate doses, with orange-flower water, and full doses of the *liquor potassæ*, or the liquor ammoniæ acetatis, with the ammonia in excess, or with camphor, and spirits of nitric æther, or either of these with digitalis and small doses of squills, are the most appropriate medicines. When there is much cough or irritation, *alkalies*, particularly the liquor potassæ, should be given freely with sedatives, especially opium or henbane; or the *hydrocyanic acid* may be prescribed with *demulcents* and *diaphoretics*. When fever is removed, but the lung still remains partially hepatised or much engorged, I have found small doses of the *iodide of potassium*, with the liquor potassæ, in a weak decoction of senega, or with sarsaparilla, of great service; frequent recourse being also had to blisters, or to rubefacient embrocations on the chest. If the vital energies become much depressed in the course of this stage, our chief reliance should be placed upon full doses of camphor, or of ammonia, with the decoction of senega, upon stimulant embrocations on the chest, and the other means advised for the next stage.

101. *f.* In the *fourth stage*—the *third* of LAENNEC — or that of suppurative infiltration (§ 55.)— the chief *indication* is to support the powers of life, in order to enable them to resist the extension of mischief, and to repair that which has been done. This, however, cannot frequently be accomplished, but it ought always to be attempted; for well-directed efforts will sometimes succeed in procuring the expectoration of whatever puriform matter may pass into the small bronchi, or in limiting the extension of the suppurative infiltration, and subsequently in procuring its absorption and the repair of the lesions which have been produced. The means with which these efforts should be made must be varied with circumstances; but camphor, assafœtida, ammoniacum, squills (pilula scillæ comp.), senega, ammonia, musk, myrrh, sarsaparilla, iodide of potassium, the mistura ferri composita, liquor potassæ, may severally be prescribed, in various forms or combinations, according to the peculiarities of the case; and aided by stimulating embrocations applied to the chest (§ 110.)

102. *g.* If *abscess* occur in this stage, the treatment need hardly be varied from that just advised; but the state of the pulse, the expectoration, the state of vital power, and the physical signs should guide the physician. When the symptoms of *gangrene* (§§ 44. 56.) appear, the treatment should depend much upon the state of vascular action and vital power attending it. In most cases, quinine, with camphor and opium or henbane, or the decoction of bark with soda and ammonia, and inhalation of the vapour of creasote, are more or less serviceable. If vascular action still continue much excited, and vital power not materially impaired, local depletions, especially by cupping, may be prescribed, even whilst the tonic and antiseptic means just mentioned are being employed. Dr. STOKES prescribed, in these cases, the chloride of lime with opium, as an antiseptic; and Dr. WILLIAMS the nitro-muriatic acid. I prefer camphor in full or large doses, conjoined with the other substances just mentioned, or with expectorants and alkaline carbonates. LAENNEC advised quinine or chinchona, either of which may be given with the camphor as above.

103. *h.* There are *various circumstances*, some of them only of occasional occurrence, which require attention during the treatment of pneumonia.—*a.* A *female* may be seized with pneumonia without the catamenia disappearing, or they may appear early in the attack; but this occurrence is not to paralyse the treatment; for, unless this discharge occur at an advanced stage, or after active means have been employed, and unless it be attended by marked abatement of the disease, blood-letting, general or local, or both, should be adopted, according to the circumstances of the case.

104. *b.* The occurrence of *delirium* during pneumonia, a circumstance long and justly considered as very unfavourable, and as generally precluding blood-letting, ought not always to forbid a recourse to this treatment, particularly if the delirium occur only in the night. In several instances I have prescribed venesection with marked benefit, although this symptom was present, the other symptoms indicating the propriety of it. Two of these were persons between seventy and eighty years of age, and in one of them venesection was twice performed. They both quickly and perfectly recovered.

105. *c.* In persons far advanced in age, in those addicted to the excessive use of spirituous liquors, in the ill-fed and badly clothed, in females during the puerperal states, blood-letting is often but ill tolerated; and it should, therefore, be resorted to

with caution. In many of these cases even a moderate sanguineous depletion is followed by increased oppression, collapse, and extended congestion and infiltration of the lungs. For these the treatment recommended for the *asthenic disease* (§ 109.) should be immediately adopted; and camphor, the balsams, senega, assafœtida, musk, ammoniacum, squills, &c., ought to be prescribed in such forms and combinations as the peculiarities of the case may suggest, and be aided by rubefacient embrocations, blisters, &c. In the cases of persons addicted to drunkenness or to the excessive use of spirituous liquors, due regard to these habits should be had during the treatment, especially in the advanced stages of the disease.

106. Calomel and opium were first recommended by Dr. Hamilton of Lyme Regis, and subsequently by Reil, Thomann, Wright, Vogel, Hufeland, Schmidtmann, and several contemporary writers. In severe sthenic cases it will be often preferable to combine them with the tartarised antimony, or to give them in much larger doses and at longer intervals, and the tartar emetic during the intervals, commencing with them immediately after the first bleeding, as advised above (§ 92.).

No. 287. ℞ Hydrarg. Chloridi ʒss.; Antimonii Potassio-tart. gr. iij.; Pulveris Opii puri. gr. v.; Confect. Rosæ, q. s. M. Fiant Pilulæ viij.; quarum capiat duas 4tis, 5tis, vel 6tis horis.

107. No dependence can be placed upon the plan of giving a large dose of opium alone after the first blood-letting, as recommended by Thilenius, Kortum, Horn, and Michaëlis, and more recently advised by Dr. Armstrong. Other preparations of opium, as the acetate or muriate of morphia, the bi-meconate of morphia, or the liquor opii sedativus, may be used instead of the pure opium, or the watery extract; but they should be given either with calomel, or with antimony, or ipecacuanha, in order to secure a beneficial effect in this disease.

108. As long as the pulse continues hard or sharp, the tongue dry, and the skin hot and unperspirable, the heating expectorants ought not to be prescribed, nor should blisters be applied. These symptoms, however, do not preclude having recourse to the turpentine embrocation, which may be applied over the chest in the manner about to be described (§ 110.); and which generally, especially when employed in aid of the treatment by calomel and opium, or by antimony, or by both conjoined, reduces the frequency and force of the heart's action, and promotes a copious perspiration.

109. *B. Treatment of asthenic Pneumonia* (§ 62.). This form of the disease seldom admits of more than *local vascular depletions*, and even these should be prescribed with caution. Where they cannot be employed, *dry cupping* on the chest or between the shoulders, as suggested by Celsus, may be substituted for them. *Camphor* is one of the most valuable remedies that can be given in this form of pneumonia. It was much employed by Thomann, Reil, Bayler, Horn, Schmidtmann, and Willich; and has been frequently precribed by the author in this state of the disease. It may be taken in doses of from two to six or eight grains, every four, five, or six hours, and conjoined with calomel and opium, or with antimony and henbane, according to the character of the attack. The latter combination may be preferred when the inflammation approaches the sthenic form, and then the camphor may be given in the smaller doses; the quantity of it being increased as the asthenic character predominates. It may be further combined with digitalis, which is not contra-indicated in this form of the disease.

110. *Embrocations* with *spirits of turpentine*, applied over the chest or between the shoulders, are the most valuable remedies that can be used in this form of the disease, and in the advanced stages of the sthenic variety (§ 30. *et seq.*). The best mode of resorting to them is by means of two or three folds of flannel, of sufficient width to cover the greater part of the chest. These should be wrung as dry as possible out of hot water, be instantly sprinkled freely with spirits of turpentine, and applied to the surface; taking care to cover them, when thus placed on the thorax, with a napkin, oil-skin, or other material which may prevent or much impede evaporation. This embrocation should be kept applied as long the patient will endure it, or be renewed from time to time. Instead of the spirits of turpentine, an embrocation consisting of equal parts of the compound camphor liniment, and of the turpentine liniment, with a little cajuput oil, may, after having been well shaken, be sprinkled on the warm flannel, and applied as thus directed. I believe that the inhalation of the vapour from this embrocation is partly influential in producing the benefit which accrues from it, and which I have witnessed in many cases.

111. In this form of the disease, and particularly in its advanced stages, the warm *expectorants* may be severally employed. The *senega*, which was praised by Thilenius, Hufeland, Beaume, Oberteuffer, and others, is amongst the best expectorant remedies in this state of the disease, particularly when aided by other appropriate medicines; as the æthers, hydrocyanic acid, the paregoric elixir, &c. *Arnica* has been also much recommended, particularly by Fischer, Hufeland, Rau, and other German physicians. I have had no experience of its effects in this malady. *Cinchona*, or the sulphate of quinine, is advised by Williamson, Laennec, and others: I have given the quinine with camphor and henbane with benefit. The infusion or tincture of *valerian* is prescribed by Horn and Thomann. I have tried it in a few cases combined with ammonia and with narcotics and sedatives, and have found it most beneficial in the complication of pneumonia with the adynamic states of the eruptive fevers, or with hooping-cough (§ 70.). *Ammoniacum, assafœtida, myrrh*, or *squills*, may severally be advantageously combined with soap, or with an alkali or an alkaline carbonate, or with other substances suitable to this state of pneumonia. *Musk* was much praised by Reill and Horn. M. Recamier has more recently employed it in very large doses, and has viewed it as almost specific in this variety of the disease. *Phosphorus* was prescribed many years ago by Barchewitz; but it does not appear to have had a sufficient trial, either then or since, in this form of pneumonia, the only one to which it is appropriate.

112. In the typhoid or asthenic states of pneumonia, as well as in the advanced stages of the sthenic, when the disease has assumed the former character, and when diffusive infiltration of the cells and small bronchi has manifestly interfered

with the functions of the lungs, benefit sometimes results from prescribing the decoction of senega in doses so large as to induce *vomiting*, or from giving along with it the sulphate of zinc, in sufficient quantity to produce this effect. In some of the *complications* of pneumonia, particularly those with hooping-cough, croup, and bronchitis, the *emetic* effect of these medicines is often very beneficial.

113. In the more *malignant* forms of asthenic pneumonia, more especially in those complications of it sometimes met with in adynamic or putrid eruptive and continued fevers, the posture of the patient should be changed as often as possible, as justly advised by Mr. GERDY and Dr. STOKES, in order to prevent the more depending portions of the lungs from becoming irreparably infiltrated or congested, from a protracted retention of the same position.

114. *C. Treatment of Complicated Pneumonia.*— The complications of the disease require not merely strict attention to their *nature*, but also to their *characters*, as respects the states of vascular action and of vital power. The treatment must be based more especially upon these latter, upon their *sthenic* or *asthenic* states, and upon the grades in which either of these characters may be manifested; but also with due reference to the nature of the complication.

115. *a.* The association of pneumonia with *bronchitis*, or *broncho-pneumonia* (§ 69.), requires general or local blood-letting, or both, commonly in moderation, and a free recourse to tartarised antimony; afterwards camphor, ipecacuanha, and the milder expectorants, with sedatives and rubefacient embrocations or blisters applied on the chest, are generally of service, and accelerate or ensure recovery. When pneumonia is associated with double bronchitis, it most commonly assumes an asthenic character, and requires the remedies advised for that form of the disease (§ 109.).

116. *b. Pleuro-pneumonia*, or the complication with *pleuritis* (§ 73.), requires a free and prompt recourse to general and local blood-lettings, in the manner advised above, and to the exhibition of calomel and opium, sometimes with colchicum or digitalis. In this association calomel and opium, in large or frequent doses, are especially beneficial in promoting the effusion of lymph, and in procuring the absorption of what may have been effused; and, although the tartarised antimony is useful, in addition to these, it is less so in this complication than in broncho-pneumonia, for which it is a principal means of cure, and to which the calomel and opium are not so appropriate. If the dulness on percussion, buzzing, bronchophony, and other signs (§ 75.), indicate considerable interstitial infiltration of lymph, and effusion from the pleural surface, calomel or other mercurials should be continued or prescribed so as quickly to affect the gums; and blisters ought to be repeatedly applied to the side. After inflammation is removed, and pleuritic effusion only remains, the hydriodate of potash, with liquor potassæ, may be prescribed internally, a mercurial being given at bed-time; and the terebinthinate embrocation, alternated with blisters, should be applied to the chest. If the effusion is so great as to endanger collapse or partial obliteration of the cellular condition of the lungs, *paracentesis thoracis*, and the means advised for this state in the article PLEURA, may be resorted to.

117. *c.* The complications of pneumonia with *eruptive* or *continued fevers* (§ 71.) are frequent and require close attention, not merely in detecting them, but also in recognising the exact states of vascular action and of vital power by which they are characterised. Upon these states will depend the treatment which should be adopted. When the fever, and consequently the pulmonary affection complicating it, assumes much of the *sthenically* inflammatory character, blood-letting general or local, but more frequently the latter, will generally be required; but in large towns, and during the epidemic prevalence of these maladies, unless they assume a decidedly inflammatory or phlogistic diathesis, vascular depletions should be cautiously practised; calomel and opium, tartarised antimony, camphor and henbane, rubefacient embrocations, blisters, and similar means, being more generally appropriate. If these complications, particularly with eruptive fevers, assume an *asthenic* or *malignant form*, the means recommended for the treatment of this form of the disease (§109. *et seq.*) should be promptly resorted to, more particularly camphor in full or large doses, with tonics, stimulants, or antiseptics, or with these and anodynes, according to the peculiarities of the case. In these complications more especially, the assiduous application of the warm terebinthinate embrocation to the chest (§ 110.), will be found remarkably beneficial. The complications of pneumonia with *fevers* — both *continued* and *eruptive* — are fully considered in the articles FEVER, MEASLES, SCARLATINA, and SMALLPOX, to which the reader is referred.

118. *d.* Of the association of pneumonia with *hooping-cough* (§ 70.), it is unnecessary to say more than I have advanced in that article. The treatment should depend chiefly upon the character of the disease and circumstances of the patient. In most instances, however, after moderate vascular depletion, most frequently local, anodynes, anti-spasmodics, emetics, rubefacients, and external derivants, will be found most beneficial. During hooping-cough, pneumonia rarely occurs in a pure form, but chiefly in that of *broncho-pneumonia* (§ 69.). In the early stage, when the paroxysms of cough are not followed by vomiting, the occasional exhibition of an ipecacuanha emetic will be of great service; and, as the disease advances, conium, hyoscyamus, or hydrocyanic acid, if the patient be not too young, may be added to demulcents or diaphoretics, in order to soothe the cough and allay local and general irritability. In the cases of *infants*, however, these and other narcotics should be used with caution. In this complication, the terebinthinate embrocation (§ 110.) applied between the shoulders, or the liniment rubbed along the spine, for a few minutes, night and morning, will prove very beneficial.

119. *e. Croup*, particularly when it is fatal, is generally complicated with pneumonia. After local depletions, the means advised for the complication with hooping-cough (§ 118.) are most appropriate, aided by emetics of the decoction of senega with ipecacuanha or sulphate of zinc, and rubefacient embrocations or blisters applied to the chest. Calomel, antimony, &c., are also generally requisite.

120. *f.* The association of pneumonia with *influenza* (§ 70.) occurs, as in hooping-cough,

in the form of *broncho-pneumonia;* and the treatment should depend chiefly upon the character of the existing epidemic. In most instances, both of such epidemics and of individual cases, vascular depletions should be resorted to with great caution. In the many cases of this complication which I treated in 1837 even local bleeding was not required; and in a very few instances where only a few ounces of blood were taken by cupping, no benefit resulted from its abstraction. The treatment should not, in this state of disease, be different from that which I have advised for the asthenic form of pneumonia (§ 109.). See also article INFLUENZA (§ 42.).

121. *g.* The occurrence of pneumonia in connection with *tubercles* or pulmonary *hæmorrhage* (§ 76.) requires vascular depletions, but generally local, more especially by cupping. Tartarised antimony, digitalis, external derivation by blisters and rubefacient embrocations, issues, &c., are the chief means which may subsequently be prescribed.

122. *D.* The remarkable *prevalence* and *fatality* of pneumonia among *infants* and *children* (see § 80.) require a few remarks. It may be asked, to what causes are the prevalence and fatality owing? The former is manifestly owing chiefly — 1st. To the greater susceptibility of the organs in infancy and childhood to the impression of external agents; and to their more marked disposition to react upon or after the impression of sedative agents, such as cold, if the sedative operation be not such as to overpower vital reaction; — and 2d. — *a.* To the circumstance of this class of patients being frequently subjected to the depressing influence of cold, without the ability of making those exertions which may enable the circulation to resist this influence. A child, before it can run about, is often carried out and exposed during too long a period to the cold air, in a state of perfect quietude; and, although the surface of the body be warmly clothed, still the cold air paralyses the organic nervous influence of the lungs, and causes congestion and engorgement of them, which are soon converted into inflammatory action, as soon as removal into a warm air — often rapidly or suddenly effected — developes vascular reaction. A certain grade of cold, relatively to the state of susceptibility and of vital action, is followed by inflammation; a greater degree of cold produces inflammation, which rapidly passes into disorganisation.

123. *b.* The *fatality* of this disease in young children is chiefly owing to the frequently latent form it assumes, to the circumstances of the patient being unable to express his feelings, or to convey a satisfactory idea of his ailments, to the complaint being often mistaken for a common cold, and to the consequent neglect of a suitable treatment until the disease has advanced beyond the reach of remedies. Hence the importance of an early attention to pectoral symptoms during infancy and childhood. A neglect of these, and allowing the slighter attacks of pneumonia at this epoch to lapse into a chronic state, or altogether leaving them to nature, are frequent causes of tubercular formations, in their incipient or early stages, which may remain for years latent, or be slowly developed, to burst forth in more open disease at some future period.

124. *c.* The *treatment* of pneumonia *in children* is not different from that in adults, due reference being had to the age, constitution, nutrition, and strength of the child; to the character or form of the disease, and the stage to which it has advanced. Very frequently the disease has advanced far before it is seen by the physician, and the period for vascular depletions has entirely or well nigh elapsed; and then mercurials and external derivants are chiefly indicated; and these are very frequently unequal to the control or removal of the disease. At an early stage, blood-letting, calomel, James's powder, or other antimonials, with suitable anodynes, are required; but tartar-emetic should be given with great caution at an advanced stage; calomel, with extract of poppies, the liquor ammoniæ acetatis, with vinum ipecacuanhæ, and a few drops of the spiritus ammoniæ aromaticus, and rubefacient embrocations, particularly the terebinthinate (§ 110.), are then the most efficacious remedies. If blisters be applied, they ought not to remain on the part above four hours, and they should be replaced by warm bread and water poultices, which may be renewed every two hours. Blisters are very apt to be followed by severe sores, or by sloughing, when applied at an advanced stage of pneumonia, if these precautions be not attended to; and the tartar-emetic ointment often produces no less unpleasant effects. The embrocations here recommended are never productive of injury. Pneumonia in children most frequently exists as a *broncho-pneumonia,* but this circumstance does not materially modify the treatment now advised. When the bronchitis is double, the attendant pneumonia is generally *asthenic,* and requires the remedies recommended for that variety (§ 109. *et seq.*).

125. *E.* Although pneumonia generally assumes an asthenic form in *aged persons,* still this does not always obtain. In a few instances, copious blood-letting may be prescribed even in very aged persons. I have directed it in a person aged about eighty years; and have mentioned above (§ 104.) instances of a successful recourse to it at nearly as great an age, even when delirium had supervened, the symptoms indicating high phlogistic action. In most cases, however, it should be most cautiously, or only locally, or even not at all, prescribed; and chiefly at the very commencement of the attack, for the period at which it is beneficial soon passes away. I have, however, found tartar-emetic alone, or with calomel and opium, well borne at a far advanced age; and expectorants especially beneficial, as the disease proceeds. Blisters, embrocations, and other external derivants are generally useful; and even at an early stage, when the pneumonia is complicated with bronchitis, which is often the case in aged as well as in very young patients, they may be prescribed.

126. *F.* In the *dark races,* and particularly among individuals belonging to them who have recently migrated to cold countries, or to highly elevated regions, and to changeable climates, pneumonia generally assumes an asthenic form. In intertropical countries, also, these races do not bear copious blood-letting, even when the subjects of pneumonia. It should, therefore, be resorted to amongst them with great caution, in small quantity, only at the very commencement of the disease; or it should be entirely omitted, and the means advised for asthenic pneumonia be had

recourse to. This inability to tolerate vascular depletions characterising these races depends chiefly upon the greater laxity of their soft solids, and the nature of their diet, habits, and modes of living. The individuals of the negro race, born in the northern states of America, and much better fed than those living within the tropics and obtaining only poor or scanty vegetable food, bear blood-letting better than they.

127. *G. Diet and Regimen.*—The *diet* ought to be strictly antiphlogistic in the *sthenic states* of pneumonia and their complications. Mucilaginous or farinaceous fluids only should be taken, in small quantity only. In the *asthenic form* of the disease, light nutriments may be given, at rather short intervals, and in very small quantity. Persons addicted to the excessive use of intoxicating liquors may be allowed, in this form of the disease, and particularly in its advanced stages, certain quantities of the beverages to the use of which they had become habituated. Children affected by the asthenic form of the disease may be allowed asses' milk, more or less diluted according to the circumstances of the case. If the disease in them be associated with gastro-enteric irritation, as is not infrequently observed, this should be the chief or only diet.

128. If gangrene or extensive suppuration take place, jellies, beef-tea, wine, &c. may be allowed. As convalescence commences and advances, weak veal or mutton or chicken broth may be given in small quantity, with boiled rice or with toast; and subsequently the lightest baked puddings, water-souchée flounders, and the white kinds of fish, &c., may be cautiously ventured upon. Attention should be paid, during convalescence and the course of the disease, to the preservation of a free state of all the secretions and excretions.

129. During the treatment the patient should be kept out of currents of cold air, in a large apartment, the temperature of which should not vary much above or below 60°. In asthenic, prolonged, or severe cases, the position of the patient ought to receive attention, with the view of preventing hypostatic congestion. Respiration and expectoration will be favoured, particularly when both lungs are affected, by raising the chest by a bed-chair. During convalescence great care should be taken at first in changing the apartment, and subsequently in exposure to the open air.

130. viii. CHRONIC PNEUMONIA. — *Chronic Inflammation of the Lungs. — Primary and consecutive Chronic Pneumonitis.*

131. DR. STOKES correctly remarks, that it is difficult to define the exact meaning of the term *chronic pneumonia*, or to draw the line of distinction between it and that low irritation of the lung which is followed by tubercular infiltration; and he seems to infer that there are two forms of the disease, the one producing the iron-grey and indurated lung, and the other forming, or ultimately passing into, tubercular solidity. The *first* he calls the simple chronic, the second the scrofulous pneumonia. Many of the cases of senile phthisis may be referred to the second variety. These forms of disease differ remarkably in their liability to produce suppuration. DR. STOKES contends, that in the scrofulous affection, suppuration, though slow in its occurrence, is almost sure to supervene; whilst in the simple form abscess is seldom observed, the termination being in that hard and semi-cartilaginous condition termed "*induration gris*" by M. ANDRAL.

132. Chronic pneumonia, in a primary form, is very rare. It is commonly observed as a sequel of the acute disease, and as a complication of other lesions of the lungs, and in connection with prolonged organic lesion of the heart. The grey induration constituting the more simple form of the disease varies in its aspect like acute hepatisation, according to the tissues chiefly affected. It may thus assume a granular or oolitic aspect, owing to the thickening, as Dr. WILLIAMS contends, of individual vesicles. In some cases it appears streaked and veined, from the hypertrophy of the interlobular septa and cellular tissue around the vessels; in others it is more uniform and of a darker colour. In this last variety, the cellular tissue between the lobules is sometimes thickened to the extent of several lines, and is of a light drab or grey colour, like that of miliary granulations, and, like them, has almost the density of cartilage.

133. These changes are chiefly consequent upon acute pneumonia which has been imperfectly subdued, but they are frequently also found complicating *tuberculous* states of the lungs; the solidifications, so frequently met with in these states of the organ, being entirely identical with the changes now described as being a sequela of acute pneumonitis; and hence it may be inferred, as noticed above (§ 67.), either that chronic pneumonia may give rise to tuberculous formations, or that tubercles may occasion a state of chronic irritation of the substance of the lungs followed by solidification. Probably both modes of morbid succession may obtain in different cases, more particularly the latter. These chronic solidifications of portions of the lung are met with in connection, not only with tubercles, but also with irregular dilatation of the air-cells; hence the organ often presents a knobby surface after death.

134. *A. The symptoms and signs of* chronic pneumonia are chiefly the continuance, in a less severe form, of those attending the acute disease. The cough, dyspnœa, or oppression at the chest, quickness of respiration, &c., are still felt, although less urgently, and are readily induced even by slight exertion. Quickness of pulse and heat of skin occur towards night, and the improvement following the acute attack is either slow, or, after a time, altogether checked. Partial dulness on percussion, with some bronchial respiration and vocal resonance, may be detected near the seat of inflammation.

135. I agree with Dr. WILLIAMS in his remark, that several cases of consumption appear to originate in this way, independently of any distinct tuberculous disease or diathesis; and I have at this time a case of this kind under my care. In these, the previous health has been good, and the chest free from any indication of disorder, before the attack of acute inflammation, which, afterwards lapsing into a chronic state, has laid the foundation for consumption, which has ultimately proved fatal. This form of disease, however, is slower and less intractable than the true tubercular consumption; it is more local and less constitutional; and if circumstances do not promote its extension, nature, aided by art, may ultimately effect partial or complete restoration of the organ.

136. *B. The treatment of chronic pneumonia*, when consequent upon the acute disease, consists

of a mild course of mercury aided by external derivation, by means of open blisters, or of tartarised antimonial ointment, or of rubefacient embrocations (§ 110.), or of issues or setons. Either after the mercurial has very slightly affected the gums, or soon after commencing the use of it, two or three grains of the iodide of potassium should be given with from 20 to 30 drops of the liquor potassæ, three times daily, in any of the preparations of sarsaparilla. The doses of these medicines, and the continuance of them, should, however, be varied with their effects, and with the peculiarities of the case. Sea-air, regulated diet, and gentle exercise, ought also to be recommended. (See Art. TUBERCULAR CONSUMPTION.)

II. EMPHYSEMA OF THE LUNGS. — SYN. *Pulmonary Emphysema.*

CLASSIF. — IV. CLASS, II. ORDER (*Author*).

137. DEFIN.—*Constant shortness of breath, dyspnœa, &c., depending upon excessive dilatation of the air-cells, or upon infiltration of air into the connecting cellular tissue, or upon both.*

138. Previous to the time of M. LAENNEC, emphysema of the lungs was viewed as an infiltration of air into the cellular tissue of this organ. That pathologist, however, extended the application of this term, so as to embrace simple dilatation of the air-cells or vesicles, and divided emphysema of the lungs into two varieties, namely, *vesicular* emphysema, and *interlobular* emphysema; the former being dilatation of the air-vesicles, the latter infiltration of air into the cellular tissue which connects them. To these, a *third* variety has been added by some French pathologists, particularly M. BOUILLAUD, consisting of an extrication of air immediately beneath the pulmonary pleura, which is elevated in the form of a cyst, varying in size.

139. i. VESICULAR EMPHYSEMA.—*Dilatation of the air-cells.* — *A. Description.* The lesion described by M. LAENNEC under this appellation essentially consists, as I have just stated, of dilatation of the air-vesicles, with some degree of change as respects their form. The dilated air-cells vary most commonly from the size of a millet-seed to that of a bean. Those of the largest bulk probably are sometimes formed of several cells, owing to a rupture of the partitions which separated them. Occasionally the dilated vesicles are not observable at the surface of the lungs, but sometimes they are considerably in relief upon it, and even are, in some cases, elevated much above it. More rarely, single vesicles are observed on the surface of the lungs distended to the size of a cherry-stone, or larger, generally globular, and apparently pediculated, owing to a constriction at the point where the cell begins to rise above the surface of the lung. Cases of this kind may be distinguished from infiltration of air beneath the pleura by the circumstance of the air not being displaced, or caused to pass or circulate beneath this membrane when the vesicle is pressed upon, as may be done when the air is infiltrated in that situation.

140. When the air-cells are inordinately distended, and when this change takes place suddenly, rupture of them, and a consequent infiltration of air into the cellular tissue connecting them, are not infrequent. This constitutes the *true* emphysema, and is nearly allied to that which takes place from wounds or laceration of the lungs. In this case, vesicles of an irregular form are found on the surface of the lung, which may be displaced by pressure with the finger. These vesicles vary from the size of a hemp-seed to that of a walnut, or even of an egg. M. LAENNEC remarks, that sometimes the air, although truly extravasated under the pleura, cannot be displaced by pressure, as now mentioned. This is observed when the air is infiltrated at the point of reunion of the partitions which divide the different groups of air-cells. In this case the projection has usually a triangular form, and is small in size.

141. The infiltrated air seldom penetrates to any considerable extent into the substance of these interlobular partitions, nor into the cellular tissue surrounding the blood-vessels and ramifications of the bronchi; but the interior pulmonary substance is sometimes lacerated by over-distension of the air-cells. When this is the case, an irregular projection is observed over the site of laceration, and is proportionate in size to it. When the projection is divided it is found to contain air, and sometimes a minute quantity of blood, either fluid or coagulated; and the surrounding air-cells, forming the immediate walls of the cavity produced by the rupture, are loose, flabby, and deprived of their natural globular form.

142. Accompanying this dilatation and occasional rupture of the air-cells, the bronchial tubes, particularly those of a small calibre, are sometimes, but comparatively rarely, dilated in those parts of the lungs where emphysema exists. They are more frequently inflamed and partially obstructed.

143. When a lung affected with this kind of emphysema is dried and afterwards cut into slices, the air-cells are generally found much more dilated than they appear externally; and some of the cells are observed simply dilated, whilst others are ruptured, the partitions of several being more or less completely destroyed.

144. This form of emphysema may affect both lungs at the same time, or one only, or a part of one or both. When vesicles of a considerable size exist not on the surface of the organ, the disease may be overlooked during *post mortem* examinations. M. LAENNEC considers that the lungs of persons who have long suffered from dyspnœa, from whatever cause, always present, upon accurate examination, dilatation of the air-cells, to a greater or less extent.

145. When the lesion exists in a very high degree, and occupies one or both lungs, the appearance is very striking. When exposed, the lungs seem confined in the thorax, and instead of collapsing as usual, often project beyond the margin of its divided parietes. They feel at the same time firmer than natural, and are flattened or depressed with greater difficulty. They are also less crepitous than in health, and the air escapes from them more slowly upon pressure, and with a sound resembling that produced by the slow escape of air from a pair of bellows. When the lung is detached, crepitation is still less perceptible; and when pressed, it produces a sensation similar to that occasioned by handling a pillow of down; probably owing to increased difficulty of communication between the air in the cells and that in the bronchia, together with diminished elasticity of the structure of the lung

itself. When a portion of emphysematous lung is placed in water, it is observed to float more lightly than a part which is healthy. It is also drier even at its roots, and less moistened by the sero-sanguineous infiltration often observed after death. When a single lung is affected, it becomes much more voluminous than the other; sometimes, so much so as to press aside the heart and mediastinum, and even to occasion an increase of the size of that side of the chest.

146. Emphysema of the lungs, which consists of dilatation of the air-cells, is, therefore, often consecutively accompanied with infiltration of air from rupture of some of the cells, but not always nor necessarily. M. LAENNEC considers the latter lesion to be of less consequence than dilatation of the cells, inasmuch as the air will be absorbed and the rupture occasionally be cicatrised, whilst the dilatation is a permanent change.

147. *B.* CAUSES.—This kind of emphysema of the lungs is generally produced by extensive or severe bronchitis, and particularly by those modifications of it termed by LAENNEC dry, suffocative, and latent catarrhs. He conceives that, in the dry catarrh, the smaller bronchial ramifications are obstructed either by pearly sputa, or by tumefaction of the membrane lining them; and that, as the muscles of inspiration are much more powerful than those of expiration, air will be drawn into the cells through the obstructed bronchi, without being expelled, succeeding inspirations, which are forcible or energetic, introducing a fresh supply of air into the cells, occasioning their distension; and, when the obstruction of the bronchi is of considerable duration, rendering the dilatation permanent. There can be no doubt that one of the most common antecedents of this form of emphysema is chronic bronchitis, particularly when it is seated in the smaller ramifications of the bronchi. The obstruction of these vessels, as well as the share the air-cells themselves have in the inflammatory state, will so far injure their elasticity as to render them more susceptible of dilatation than in the healthy condition.

148. Other causes may also conspire to produce this lesion of the air-cells, such as long retention of the breath, as in the case of players on wind instruments, and reading or speaking aloud for an unusually long period. Violent exertions of any kind, which require the long-continued retention of the breath, are also causes of this kind of emphysema, although more frequently of the kind next to be considered. In rarer instances, this lesion may be produced by tumours obstructing or pressing upon the bronchi, whether those developed in the lungs themselves, as cysts, tubercles, polypi of the bronchi, &c., or those produced exteriorly to this organ, as aneurisms of the aorta, enlargements of the bronchial glands, tumours in the mediastinum, &c. It may be also consequent upon the spasmodic affections of the large bronchi sometimes attendant upon asthma, bronchitis, croup, and hooping-cough, and upon tuberculous formations, and the solidifications attending chronic pneumonia.

149. *C.* SYMPTOMS AND DIAGNOSIS.—Shortness of breath and dyspnœa more or less urgent and continued, are the most remarkable symptoms of this disease. In all the cases of it observed by M. LAENNEC, there had been habitual cough. Sometimes this was slight, infrequent, and either dry or attended with a scanty expectoration of a viscid, greyish, and transparent mucus: at other times it was more severe, occurring in paroxysms and accompanied by abundant opaque mucous expectoration. There is no fever, and the pulse is generally regular. In slight cases the habit of body and complexion are scarcely altered; but in more severe cases the countenance assumes a dull earthy hue, and the lips become violet, and somewhat tumefied. The difficulty of breathing is constant, but is increased by flatulence of the stomach and bowels, anxiety, exercise, ascending heights,—by indigestion or a loaded stomach, catarrh or bronchitis: it also presents exacerbations or paroxysms, occurring at irregular intervals, and continuing an indefinite time. The dyspnœa and cough, however, should be considered as being less the signs of emphysema, than of the disease of which emphysema is the consequence.

150. This form of emphysema of the lungs sometimes begins in infancy. It may even continue, when slight, from that period of existence through life, without materially abridging it; if the person so affected live in an easy, regular, and abstemious manner. It, however, more frequently tends to aggravate, modify, and induce other diseases, so as greatly to diminish the probabilities of life. The disordered state of respiration always attendant on it particularly affects the functions of the heart, and ultimately its organisation, giving rise at last to dilatation and hypertrophy of the cavities of the organs.

151. When vesicular emphysema is confined to one lung, or is much greater in one than the other, the side thus affected is perceptibly larger than the other, its intercostal spaces are wider and fuller, and it yields a clearer sound on percussion. If both sides are equally affected, the parietes of the thorax are depressed much less than natural during expiration, whilst the efforts to accomplish the depression are very much greater; and the whole chest, instead of its natural compressed form, is more rounded and globular, swelling out both anteriorly and posteriorly; and yields a more hollow or clearer sound on percussion than usual. Dr. STOKES thinks that the symptoms are more severe when the lower lobes of the lungs are chiefly affected.

152. The only *diagnostic* or pathognomonic symptoms are, however, furnished from a comparison of the indications derived from auscultation and percussion. The respiratory sound is inaudible over the greater part of the chest, and is very feeble where it is audible, a very clear sound being, at the same time, produced by percussion. At intervals, also, particularly when the patient coughs, a slight sibillous rattle, or a clicking or cracking sound is heard, occasioned by the displacement of the mucus in the bronchi. These signs, together with the rational symptoms already enumerated (§ 149.), and the history of the case, will generally enable us to form a diagnosis. When one lung is principally affected, the increased size and sonorousness of this side will sufficiently discriminate the disease from all others, excepting *pneumo-thorax*, from which also it can readily be distinguished, as shown in the article PLEURA. When vesicular emphysema exists in a very high degree, LAENNEC considers that it may be

accurately ascertained by the presence of what he calls the crepitous rattle with large bubbles. In this case, the sound during inspiration and coughing is like that produced by blowing into half-dried cellular membrane. It differs from the common crepitous rattle, in conveying the idea of dryness, and of being connected with bubbles which are at once large and unequal, the other rattle having qualities exactly the reverse. This phenomenon is, however, not frequent, nor of long duration, and occurs only in points of small extent. It is more common and more permanent in the *interlobular emphysema*. In rare instances the patients are sensible of a crackling in the spot where this rattle is heard. Dr. Williams has sometimes observed a sound of friction, seemingly produced by the rubbing of lobules or cells against the costal pleura.

153. *D.* Progress and Prognosis. — Dilatation of the bronchial vesicles takes place only in a gradual manner. When it has reached a certain pitch, it may continue stationary for an indefinite period, and afterwards increase, or it may even diminish slowly, and disappear altogether. This last result is, however, of comparatively rare occurrence, and only takes place when the causes of the lesion have entirely ceased to act. When the dilatation of the vesicles is extreme and general throughout one or both lungs, the obstacle to respiration is then very great and the danger considerable, inasmuch as this change indicates the existence of an antecedent lesion of great severity and importance from which it proceeds and with which it subsequently becomes complicated. But when the vesicular emphysema is moderate, it is not to be considered, in itself, as a dangerous affection. According to M. Laennec, it is of all the forms of asthma (of which disease he considers it, but too generally and indiscriminately, as the proximate cause), that which admits the most of expectations of length of life. There can be no doubt that it constitutes one of the most frequent pathological states existing in cases of continued dyspnœa, particularly in the chronic forms of the disease, and in persons advancing in years who have been subject to the occasional causes of this kind of emphysema. In general it may be remarked, that this affection is a consequence of another disease of the respiratory organs, to which even more regard should be paid, both as respects prognosis and treatment, than to itself; and more particularly of those noticed above (§ 148.); and that it often supervenes upon and attends tuberculous formations and solidification of portions of the substance of the lungs, consequent upon repeated attacks of pneumonia, or upon the chronic states consequent upon the acute form of that disease.

154. Dr. Stokes, amongst other *conclusions*, arrives at the following respecting the vesicular form of emphysema: — 1st. That the disease consists essentially in an enlargement of the air-cells: — 2d. That the rupture and coalescence of several cells is not a constant occurrence: — 3d. That the disease increases the volume and rarefaction of the lung (when it is far advanced): — 4th. That it may occur uncomplicated with any other affection except bronchitis, or it may exist along with other diseases, which are generally chronic: — 5th. That it may coexist with great dilatation of the tubes: — 6th. That it may be *partial* or *general*: — 7th. That percussion gives a morbidly clear sound when the disease has attained a certain extent: — 8th. But that the cells may be so enlarged as to evince feebleness of respiration without change on percussion: — 9th. That the physical signs of bronchitis which occur, though indicating disease in the smaller bronchi, are not characteristic of the affection: — 10th. That the stethoscopic indication is the want of proportion between the sound of vesicular expansion, the results of percussion, and the efforts of inspiration: — 11th. That the increased volume of the lung is the source of an important physical sign; this increase being ascertained by measurement of the chest, by displacement of the mediastinum, by depression of the diaphragm, and by the lateral displacement and the depression of the heart: — 12th. That the physical signs from auscultation are much modified by the degree of yielding of the thoracic parietes; the characteristic feebleness of respiration appearing to be directly as the amount of resistance to the increased volume of the lung: — 13th. That the intercostal spaces are not protruded in this disease: — 14th. That cases of it may be divided into *two classes:* viz. those in which *the diaphragm is unaffected*, and those in which it *is depressed:* — 15th. That in the *first class* the abdomen is collapsed, and without tumefaction in the epigastric or hypochondriac regions, the heart being in its natural position: — 16th. That in the *second class* the reverse occurs; the liver is depressed, and the heart so displaced as to be found pulsating as low as the ninth intercostal space; the postero-inferior portions of the chest sounding clear even to the last rib: — 17th. That the volume of the lung varies remarkably at different periods: — 18th. That when it is greatest, all the physical signs are most evident: — 19th. That the cause of its increase is a return or exacerbation of bronchitis: — 20th. That under treatment calculated to remove bronchial irritation the vesicular murmur may return, and the volume of the lung be diminished.

155. ii. Interlobular and Sub-pleural Emphysema. — *The infiltration of air into the interlobular cellular tissue, or under the pulmonary pleura*, is the consequence either of a sudden and immediate laceration of some of the bronchial vesicles, as in cases of external injury, or of rupture of these vesicles from previous inordinate dilatation of them (§ 140.) of some duration — a consequence of the emphysema already described.

156. *A. Anatomical Characters.* When the air is infiltrated into the compact cellular tissue forming the partitions between the pulmonary lobules, small bubbles or vesicles are formed at the surface of the lungs, and disposed in the form of transparent bands, penetrating more or less deeply into the opaque substance of the organ, and becoming narrower the more deeply they pass into it. These small bubbles of air are occasionally also found in the cellular tissue in the course of the pulmonary blood-vessels. Sometimes the interlobular bands of emphysema run parallel to each other, with sound portions of lung intervening. More rarely they cross one another in such a manner as almost to isolate several of the pulmonary lobules. The transparency and want of colour of these bands, by which they are readily distinguished from the opaque pulmonary structure, are chiefly owing to the infiltration of the

air, and to the drier state of the cellular tissue into which the air is passed.

157. The infiltration of air into the sub-pleural cellular tissue gives rise to bubbles or vesicles, sometimes of very considerable size, and, in rarer cases, the pleura is elevated into very remarkable bladders. Upon pressing the bubbles of air extravasated in this situation, they are readily displaced and made to pass along the surface of the lungs. When interlobular emphysema is in the vicinity of the roots of the lungs, it frequently extends to the mediastinum, and thence to the neck and to the whole sub-cutaneous and intermuscular cellular tissue.

158. Although this kind of emphysema necessarily supposes the rupture of certain air-vesicles, the rupture has seldom or ever been satisfactorily demonstrated. It has therefore been believed by some that the air is secreted in the cellular tissue from the blood-vessels of the lungs, and not extricated from rupture of the cells or smaller bronchi; and others suppose that it is exhaled into this tissue from the obstructed cells and minute bronchi.

159. The different kinds of emphysema now described — the vesicular, interlobular, and subpleural — may co-exist in the same person; but this is a very infrequent occurrence. The vesicles arising from morbid dilatation of the air-cells may in such cases be distinguished from those occurring from the infiltration of air into the cellular tissue, by means of pressure and insufflation, by which the air is not made to circulate, or pass from one part to another, in the former as in the latter.

160. *B. The Causes* of this kind of emphysema are those of the vesicular emphysema, particularly when acting in a very marked manner. Infants and children are more subject to this lesion than adults, especially during attacks of croup, in the advanced stages of pertussis, and in severe attacks of bronchitis, where there is much obstruction of the air-tubes; and from fits of anger, or from struggling and crying, owing to the violent inspirations taken in such circumstances. Forcible retention of the breath during powerful or long-continued exertions; wounds, injuries, or laceration of the lungs; lifting heavy weights, straining at stool, and the advanced state of the acute suffocative catarrh or bronchitis, are the most efficient and frequent causes of this kind of emphysema in adults. The spontaneous secretion or exhalation of air into the cellular tissue of the lungs may possibly be a cause of the disease; but this has not been satisfactorily shown. M. Laennec remarks that interlobular emphysema is very seldom consequent upon the vesicular form of the disease, owing to the great density of the cellular tissue intervening between the air-cells and lobules, as shown by Reisseinsen; and, perhaps, to some degree of thickening of the parietes of these cells during the continuance of their dilatation. Extravasation of air into the cellular tissue, connecting the pleura with the lungs is much more frequently met with as a consequence of the vesicular species of the disease.

161. *C.* The *symptoms* and *diagnosis* of this species of emphysema are dyspnœa and shortness of breathing suddenly following violent exertion, or continuing in a marked degree after croup, suffocative catarrh, or any other disease which may have occasioned obstruction for a time of the bronchi. In some cases the patients are sensible of a kind of crepitation in the part affected. On *percussion* the chest generally sounds well over the site of the emphysema, unless an engorged state of the lungs from peripneumony exists with it. *Auscultation* detects "the dry crepitous rattle with large bubbles," which Laennec considers pathognomonic of this lesion, particularly when this sign is very distinct and continuous. It is never wanting, and is always more marked than in the vesicular emphysema. Together with this sign, a sound or sensation as of one or more bodies rising and falling, and rubbing against the ribs, are usually perceived during inspiration and expiration. The dry crepitous rattle with bubbles, and the friction of ascent, during inspiration, and of descent, during expiration, with the occasional production of the crepitation by pressing the intercostal spaces over the affected part, are the signs of this lesion most to be depended upon, and are the least liable of the other stethoscopic signs to temporary interruption from obstruction of the bronchial tubes. Should an external emphysema appear at the same time with, or subsequent to, the above symptoms beginning in the neck, the nature of the disease then becomes perfectly evident.

162. iii. Treatment.—*A. Of Vesicular Emphysema.* Care should be taken to avoid the exciting causes, more especially all exertions of the voice, and exposure to the inhalation of dust, or of particles of any kind which may float in the air that is respired, or of deleterious gases or vapours. Violent mental emotions, and the influence of cold and humidity, or other causes of catarrh, coryza, &c., should also be shunned. Attention ought to be directed to the state of the digestive organs; the secretions and excretions being preserved in a regular state, and flatulent distension of the stomach and bowels being prevented. These objects ought to be kept in view, particularly as respects those who have had parents affected by the disease, even although they may not themselves have experienced an attack; for it would appear, from what M. Louis has advanced, that the parents of more than one half of the patients which he treated had been similarly attacked; thus indicating an hereditary predisposition to the disease in a very large proportion of those affected by it. In entering upon the treatment we should endeavour to distinguish the cases which are *simple* from those which are *complicated,* or consequent upon, or associated with, organic or other affections. Most of the means of cure recommended for *chronic bronchitis* (see art. Bronchi, § 91. *et seq.*) are more or less beneficial in this affection. The medicines which I have found the most serviceable, particularly when the complaint is exacerbated by cold, &c., are camphor, myrrh, assafœtida, and the balsams, with henbane, or extract of poppy, or opium; the decoction of senega with an aromatic water; the liquor potassæ, and small doses of the iodide of potassium; the mixtura ferri composita, with the alkaline sub-carbonates and anodynes or narcotics; the compound decoction of sarsaparilla, with an alkali and an anodyne; the sulphate of zinc, with the compound ipecacuanha pill; and the compound squill pill, with soap, and the compound galbanum pill. Rubefacient *liniments* and *embrocations* (§ 110.), or a blister or warm plaster applied to the chest, or any of the stimulating *liniments* prescribed in the

APPENDIX (F. 296. *et seq.*) rubbed along the superior parts of the spine, will also materially contribute to the relief of the patient. The *inhalation* of various balsamic fumes or terebinthinate vapours, or the vapour of tar, of creasote, or of iodine, when much diluted in the steam of warm water, as advised at another place (see art. BRONCHI, § 100.); or *smoking* stramonium, opium, or tobacco, or other narcotics, is generally very beneficial in the more urgent cases.

163. It has been supposed that vesicular emphysema, when once established, cannot be altogether removed. Dr. OSBORNE and Dr. STOKES, however, think that the disease is susceptible of very great amelioration, if not of complete cure. In this opinion I concur. As the disease is a consequence of hooping-cough, bronchitis, chronic pneumonia, and the dry catarrh of LAENNEC, much of the treatment which is appropriate to these maladies is also suited to it. When symptoms of congestion in the lungs still continue, or when the complaint has recently followed these or other affections of the lungs, local depletion by means of cupping, or even dry-cupping, may prove useful. If local depletion be adopted, it should be resorted to before expectorants, and the means just mentioned, are prescribed. It has been suggested by Mr. MARTIN and Dr. STOKES to try the effect of strychnia in this disease; but the contractility of the air-cells and tubes can hardly be restored by other means than by those which will promote the general tonicity and health of the frame; and of these, residing in a pure, dry, and moderately warm atmosphere, and attention to all the digestive and assimilative functions, are the most influential.

164. *B.* When the disease is *complicated* with some other lesion, as congestion, inflammation, or obstruction of the minute bronchi, with chronic bronchitis or dry catarrh, or with chronic pneumonia, tubercular infiltration, or solidification of portions of the lungs, the treatment should be chiefly directed to these in the first instance, and subsequently to the restoration of the tone of the pulmonary cells, by the several means above suggested; and by those more fully stated in the articles ASTHMA and BRONCHI, and more especially by those recommended for the *chronic states of Bronchitis.* In some instances I have found a residence in as dry and mild an air as the *sea coast* can furnish of great service. In two or three cases removal to Ramsgate, Brighton, Worthing, or Hastings has been advantageous. The *sea air* being invigorating to the lungs, voyaging may prove of service, particularly in the cases of young persons affected with the slighter grades of the complaint.

165. *C. The treatment of interlobular and subpleural Emphysema* requires few remarks. When air is infiltrated in the cellular tissue of the lung it is soon absorbed. When it continues or increases, it is probable that the passage of the air from the minute bronchi into the cellular substance is not interrupted by the closure of the minute laceration through which the air passed; but the laceration generally closes by means of the lymph effused, as these cases, with few exceptions recover, whatever means may have been prescribed.

III. ŒDEMA OF THE LUNGS.—*Pulmonary Œdema.*

CLASSIF. — IV. CLASS. II. ORDER (*Author*).

166. DEFIN.—*Infiltration of a serous fluid into the cellular tissue between the cells of the lungs, and probably also into the cells themselves, occasioning dyspnœa, cough, and short breathing.*

167. *A.* The *anatomical characters* of œdema are the pitting of the organ on pressure, its greater gravity and paler colour than in the healthy state, its imperfect collapse or subsidence upon opening the chest, and a copious exudation of a frothy serum when it is divided. Œdema of the lungs occurs generally as a consequence of disease of the heart, particularly of the valves and orifices, occasioning obstruction to the return of blood from the lungs; of the exanthematous fevers; of other diseases of the lungs; and of obstructions of the kidneys, liver, &c.; it thus arising from the same maladies which occasion other dropsical infiltrations or effusions, and being often associated with serous effusions in other situations. This lesion, although previously noticed by ALBERTINI and BARRÈRE, was first correctly described by M. LAENNEC; by whom, as well as by other writers, it was ascribed to *two* causes, viz. increased effusion from interrupted circulation, and impaired absorption of the serum poured out to facilitate the vital functions of the lungs, owing to excessive vascular plethora, impeded circulation, or impaired vital power. LAENNEC believed that a certain degree of œdema attends the resolution of most cases of pneumonia. From this it will appear that it can rarely be a primary or idiopathic affection. Slighter grades of it not infrequently occur in the advanced stages of adynamic or typhoid fevers, particularly in the posterior or more depending parts of the lungs, but generally in connection with hypostatic congestion in the same situation; and are not to be distinguished from this condition, or from incipient congestive pneumonia.

168. *B.* The *symptoms* of œdema of the lungs are very equivocal, and vary greatly with the pathological states from which it arises. When it becomes extensive, it causes dyspnœa, short breathing, cough, and serous or thin mucous expectoration. — The *physical signs* are a crepitant or sub-crepitant rhonchus, with the breathing less fine or even than in pneumonia, and indicating the presence of more fluid in some of the larger tubes, by the mucous rhonchus. The natural vesicular rhonchus is rendered indistinct, particularly at the lower and posterior part of the chest; and percussion is followed by a duller sound, especially in those situations. These symptoms are not very different from those of the early stage of pneumonia; but the absence of fever and of the characteristic expectoration, and the presence of œdema of other parts, and of other signs of the organic lesions usually producing œdema of the lungs, sufficiently distinguish the nature of the disease. There can be no doubt of œdema occurring much less frequently in the lungs than the external cellular tissue; and it probably is never, or is very rarely, seen, but consecutively upon anasarca or external œdema.

169. *C.* The *Treatment* of œdema of the lungs should be based entirely upon the pathological conditions which occasion it. That which attends or follows low eruptive or continued fevers, particularly scarlatina, should be treated by dry cupping, frequent change of position, by diuretics, digitalis, senega, camphor, and the means above advised for *asthenic pneumonia* (§ 109. *et seq.*).

IV. Hypertrophy and Atrophy of the Lungs. Classif. — (See § 166.)

170. i. Hypertrophy of this organ is rarely met with in a true or unequivocal form. A spurious form of it arises in consequence of chronic pneumonia and emphysema. A state of the organ, which has been described by Dr. Clendinning in connection with disease of the heart, and which consists of a denser, heavier, and more developed condition, without any apparent obliteration of the vesicular structure, and either with or without congestion, closely approaches hypertrophy. It occurs chiefly in consequence of hypertrophy of the right ventricle of the heart, with difficult circulation through this organ. It is evident that this associated disease of both lungs and heart will be attended by shortness of breathing, more or less dyspnœa, particularly on exertion, and slight dulness of sound on percussion.

171. ii. Atrophy of the lungs, or a state opposite the foregoing, takes place as a consequence of age; the cells becoming larger, apparently from the absorption or wasting of their intermediate parietes or septa; the substance of the lungs being softer, paler, more flaccid, and less dense than natural. A similar change is rarely observed in cases of chronic emaciation and debility. *Partial atrophy* is often observed as a consequence of bronchitis, tubercles, pneumonia, and pleuritis. Andral and Stokes have argued that, when a portion of the lungs does not admit the air, owing to obliteration or obstruction of the bronchus supplying it, atrophy of it is the result, the consequent deficient circulation of blood to it, and impaired nutrition, necessarily causing this; and it has been even further supposed that an impaired state of function of the lungs, or any limitation of the function, may have some effect of the same kind, as respects the whole organ.

172. V. Abscesses perforating the Lungs. — An abscess may form, or purulent matter may collect, in any of the following situations; and, by perforating the tissue of the lung, pass into the bronchi, whence it may be evacuated: — 1. In the thoracic or abdominal parietes, perforating successively the adherent pleura and pulmonary tissue. — 2. In either of the pleural cavities, and thence directly passing into the lungs. — 3. In the anterior or posterior mediastinum, through the pleura and lungs (see Mediastinum, *Abscess of*), and — 4. In the liver, thence passing through the diaphragm and pleura, as shown in the article Liver (§ 141.). The *first* of these rarely occurs: the *second* still more rarely, unless the purulent collection in the pleura is limited by adhesions of the opposite surfaces of this membrane: the *third* also rarely, but I believe more frequently than generally supposed. In a case recorded by Dr. Froriep (*Medicinische Zeitung*, July, 1834), an abscess of the anterior mediastinum communicated both with the lung and the vena cava. The *fourth* mode in which abscess may perforate the lung is not infrequent; sufficient notice of it and of the phenomena consequent upon it has been taken in the article Liver, *Abscess of*.

173. VI. Gangrene of the Lungs — *a.* Gangrene in this organ is always a consequence of inflammation; but whether or not it be always caused by inflammation seated in the substance of the lung itself, or in a large vessel conveying blood to a portion of the organ, causing obliteration of this vessel, and consequent interruption to the circulation in that portion, has not been fully determined. It is not improbable that it may arise from either, or from asthenic or congestive inflammation of a portion of the substance of the organ extending to the blood-vessels. Dr. Stokes seems to believe that it may proceed from the suddenness and completeness of the congestion occurring in a morbid state of the patient; and the cases which he has instanced support this view. In all these the patients were long addicted to the use of spirits — a cause, however, of artereitis as well as of phlebitis. In one case there was chronic circumscribed gangrene, with an isolated slough in one lung, followed by acute sphacelus in the other; in another, an enormous gangrenous abscess, succeeding to contused injury of the chest; in a third, a gangrenous cavity occurring after causes likely to produce intense congestion of the organ; and in the fourth, gangrenous abscess supervening upon asthenic pneumonia. Two instances of undoubted gangrene of a portion of the lung which have occurred in my practice were observed in circumstances altogether similar to the above; both were in persons whose constitutions were injured by intemperance, and both followed congestive or asthenic pneumonia, which had been neglected in its early stages. One of these cases recovered by the aid of means about to be noticed. Drs. Williams and Hudson have also recorded cases of recovery after gangrene of a portion of the lungs, in the works referred to in the Bibliography.

174. *b.* The *symptoms* of gangrene of a portion of this organ are chiefly the appearance of a most disgusting odour of the breath and expectoration, rendering the patient loathsome to those around him, and even to himself; with general sinking, or remarkable depression of the powers of life, and collapse of the features, consequent upon a severe attack of asthenic pneumonia. The matter expectorated generally consists of a fœtid greenish, or of a dark-coloured sanious matter or fluid, sometimes attended by a discharge of blood. Dr. Stokes remarks, that the stench is not constant; for, during the progress of a case, it may disappear more than once. In some cases the expectoration is fœtid, while the breath is comparatively free from odour; but the gangrenous stench is generally perceived when the patient is made to cough.

175. *c.* The *treatment* of gangrene of the lungs should be based upon the *intention* of enabling the system to resist the contaminating influence of the septic matter formed in the organ, whilst means are being used to diminish the septic tendency of the matter — whilst bark, the chlorides, and camphor, with opium, are taken internally; and wine in the intervals between the exhibition of these, chlorine gas, or the fumes of creasote and camphor, may be inhaled. Dr. Stokes advises the use of the chloride of lime and opium. In the cases to which I have alluded (§ 173.), a somewhat similar treatment to the above was prescribed. In the first, which occurred many years ago in dispensary practice, the decoction of bark with the chlorate of potash, and compound tincture of bark, was ordered, and chlorine gas was inhaled. Camphor and opium were also taken at intervals; and the terebinthinate embro-

cation was almost constantly applied on the chest. In the second, which I saw more recently in consultation, very nearly the same means were employed, and the fumes of creasote and camphor were inhaled. In this, the unsuccessful case, the remedies appeared for a time to arrest the disease. LAENNEC recommends for this state the sulphate of quinine; and Dr. WILLIAMS the nitro-muriatic acid, which was used in the case which recovered under his care; but the particular means should be selected with reference to the previous condition and the habits of the patient.

176. VII. TUBERCLES are the most frequent lesions to which the lungs are liable. They are fully considered with reference to this organ, in the articles TUBERCLES and TUBERCULAR CONSUMPTION.

177. VIII. MALIGNANT STRUCTURES IN THE LUNGS. — The *lesions truly malignant* which are occasionally met with in the lungs are *scirrhus*, *encephaloid* or *fungoid disease* — the *medullary sarcoma* of some writers — and *melanosis*. — *A. Scirrhus* or *cancer* is very rarely observed in a true or unequivocal form in the lungs; and then only in the scirrhous state, the subsequent stages of softening, ulceration, &c. of the indurated mass, not having supervened. Scirrhus of the lungs occurs only consecutively of cancer in some other part; and most frequently of the mamma. It may involve the parietes of the chest, pleura, and a portion of the lungs; there being firm adhesions of the pleura, a shrunk, dense, and glistening state of the lungs, and dilatation of some of the bronchi. In rare cases a portion of the organ is indurated, glistening when divided, particularly near the large bronchi, and similar to scirrhus; and yet the absence of cancerous disease from all other parts renders the malignant nature of this change very doubtful. Dr. CORRIGAN has denominated this, or a very similar change he has observed in the organ, *cirrhosis* of the lungs. Open or ulcerated cancer of the lung is rarely or never seen. Dr. BAYLE has recorded a case in which this change was said to have been observed; but he has not stated whether or not the ulcerated cavity communicated with the bronchial tubes.

178. *B. Fungo-hæmatoid disease*, or *medullary sarcoma*, is sometimes met with in the lungs, much more frequently than scirrhus, and occurs either in separate *tumours* or *infiltrated* through the organ.— *a*. The medullary tumours vary remarkably in this situation. They are, in some cases, soft and brain-like; in others tough, more dense, or even fibro-cartilaginous, or much softer, and resembling the pancreas in colour and consistence. They are either encysted, or irregular and non-encysted. In some they are loose, cellular, and vascular, and contain patches of extravasated blood. In others the texture of the morbid mass partakes of two or more of the above characters. Indeed, these malignant formations — cancerous and medullary — are modifications of nutrition, depending, as I have remarked in the article CANCER (§ 26.), upon a weakened and otherwise morbid state of the system generally; this state occasioning specific changes in the organic sensibility, nutrition, and secretions of parts according to predisposition or concurring causes.

179. *b*. When the medullary matter is *infiltrated* through the lungs, it appears as intermediate between tuberculous disease and chronic hepatisation or consolidation, and is apt to be confounded with either of those, if medullary sarcoma has not been detected also in some other organs or parts.

180. *c*. Whilst scirrhus is, perhaps, never primarily developed in the lungs, medullary sarcoma may occur either primarily or consecutively in them; or it may be coëtaneous in this and in other organs or parts. It is obviously a constitutional malady, and depends originally upon a depraved state of the vital powers, in connection with alteration of the circulating fluids, the albuminous portion of which is deposited in certain parts, in an exuberant and modified form, and subsequently undergoes a low and morbid state of organisation and nutrition. (See art. FUNGOID DISEASE, &c., § 18. *et seq.*)

181. *C. Melanosis* is the third form of malignant disease of the lungs; and is met with in them either in the form of distinct tumours, or as irregular cellular-like deposits, or as infiltrations of the natural structure, or, indeed, in the several states presented to observation in other parts of the body. It may affect the lungs exclusively, but this is extremely rare. It is most frequently observed in this organ and in other parts of the body in the same case. It is occasionally associated with carcinomatous or with fungoid disease. (See art. MELANOSIS.)

182. *D. Symptoms, &c.* — The occurrence of these malignant diseases in the lungs is rare, and ascertained with difficulty during life, unless pectoral *symptoms* appear during the existence of either of these maladies in some external part. The symptoms occasioned by them depend much upon the extent to which they invade the organ; and the physical signs closely resemble those of solidification from hepatisation or tuberculation. The history of the case, the general symptoms, the absence of the local or constitutional signs of tubercles, and the cachectic state of the system, with or without the appearance of anæmia, will serve to direct the diagnosis. In the early stages of these maladies, however, the symptoms are very equivocal; and consist chiefly of impeded breathing and circulation through the lungs, with emaciation, cachexia, anæmia, dropsical effusion, dyspnœa, a leaden or livid hue, &c. At more advanced periods, the expectoration, which was previously scanty or absent, becomes more abundant, and is similar to that of bronchitis or pneumonia, owing to the supervention of either or both, in the course of the malady, or rather of the destructive process occasioned by the morbid mass on the adjoining tissues. In some instances, the sputum is streaked with blood, and, in rare cases of melanosis, with some black matter.

183. When these maladies are developed chiefly in the lungs, they occasion *death*, by compressing or obliterating large vessels and bronchial tubes; and by ulcerating, or destroying by their pressure, or otherwise changing, by invading, the adjoining tissues. Cavities may be formed in the lungs in consequence of the pressure or development of fungoid or melanoid tumours; but this result is very rarely observed, unless consecutively upon the fungo-hæmatoid tumour.

184. The *treatment* of these lesions is altogether hopeless when they implicate the lungs.

185. IX. SPURIOUS MELANOSIS — *Anthracosis*, STRATTON — occurs in the lungs in a peculiar form, and from a cause affecting only this organ,

namely, from the *introduction of carbonaceous matter*, or from the *infiltration or imbibition of carbonaceous molecules*. This alteration of the organ was first noticed by Dr. PEARSON, and subsequently by Drs. GREGORY and THOMSON (*Edin. Med. and Surg. Journ.* No. 109.), and by Dr. CARSWELL (*Patholog. Anatomy*, art. "Melanoma"). This change occurs chiefly in the lungs of old people, or of those who have been long engaged in avocations by the light of smoky lamps, or in mines; and it has been observed in various grades. When fully produced both lungs present an uniform black or carbonaceous colour, affecting nearly all their tissues. The bronchial glands partake also of the same colour. This change has been shown, by the experiments and observations of Drs. CHRISTISON and GREGORY, to arise entirely from the smoke, soot, and minute particles of coal dust inhaled during the respiration of air loaded with these carbonaceous matters. A portion of these seem to be imbibed, or absorbed, by the bronchial membrane, until a considerable accumulation takes place. This may be greater in certain parts of the pulmonary structure than in others; but when it has advanced far, it seems to act as foreign matter, and to cause, or to favour, the development of irritation or even ulceration; or to render the lungs more dense and friable; this organ being even infiltrated by a black serosity, and also broken down in parts into irregular excavations, in the more extreme cases. The physical characters of this alteration — the uniform black colour of both lungs, the absence of any similar discolouration of any other organ, its occurrence in persons habitually exposed to the inhalation of the carbonaceous particles contained in the air of mines, or of smoky apartments, and the black matter colouring the organ being shown by experiment to consist essentially of carbon, demonstrate clearly the origin and nature of this change.

186. X. HÆMORRHAGE INTO THE LUNGS — *Pulmonary Hæmorrhage — Hæmorrhage of the Substance of the Lungs — The Pulmonary Apoplexy of* LAENNEC and other French pathologists. — In the article HÆMORRHAGE (§ 96.) I very fully considered the pathology and treatment of "*Hæmorrhage from the respiratory organs*," or "*Hæmoptysis*," as the disease has been very generally denominated. In it the hæmorrhage most frequently proceeds from the bronchial membrane; although the blood may also proceed from the substance of the organ, and, owing to rupture of the vesicular and cellular tissues of the organ, be poured into the bronchi, and thence be ejected, or be carried along the smaller bronchial ramifications. It is this latter, or pulmonary, form of hæmorrhage to which I shall now briefly allude.

187. *Hæmorrhage from and into the substance of the lungs* arises from the same causes as were shown to produce hæmoptysis, and presents similar complications and pathological relations as pointed out in that form of *Hæmorrhage* (§§ 108—120.). Pulmonary apoplexy or hæmorrhage (1.) may be confined to the vesicular structure of a portion of lung, the blood being poured out in the vesicles; (2.) or it may be seated in the cellular tissue, or, having ruptured the air-cells, have passed into this tissue; (3.) or it may have ruptured the pleura and passed into the pleural cavity. These varieties are usually preceded by *pulmonary congestion* of longer or shorter duration.

188. *A.* When the effused blood is enclosed in the air-cells, Dr. CARSWELL describes it as forming a round, circumscribed, solid mass, surrounded by the natural spongy tissue of the organ. The cut surface of this mass is of a very deep red colour, has a homogeneous aspect (excepting the open mouths of the bronchi and large blood-vessels, which are of a light red), and a granular arrangement, which is partly effaced by passing the edge of the scalpel over it, thereby removing the coagulated blood from many of the air-cells, a minute honey-comb appearance being thereby produced. The size of the masses varies from half an inch to two inches in diameter.

189. *B.* When the blood is poured into the cellular tissue, generally owing to laceration of the air-cells, it spreads to a great extent, sometimes to the greater part of a lobe, or even of a whole lung. In this case a ragged excavation is formed, filled partly with fluid, partly with coagulated blood, which penetrates portions of the engorged and lacerated pulmonary substance. This form of hæmorrhage may coexist in the same portion of the lung with the preceding. When this is observed, the round form, circumscribed margin, and hardness which accompany the first are well marked, and in the centre of this, when laceration has occurred, there is a quantity of coagulated blood (CARSWELL).

190. *C.* The third form is a consequence of the second, the effused blood occasioning laceration, not only of the cellular tissue but also of the pleura.

191. When blood is effused into the vesicular or cellular structure of the lungs, it may be retained in these situations, or a part of it may pass into the bronchi and be expectorated. The latter occurrence is much more common than the former; and constitutes a variety of hæmoptysis, which can rarely be distinguished during life from that variety consisting of hæmorrhage from the bronchi. The quantity of blood which finds its way into the bronchi is generally in proportion to the extent or laceration of the pulmonary tissue. When it is great, it may not only fill the bronchi of the affected lung, but also those of the opposite one, and thus occasion asphyxia.

192. *D.* The *Terminations* of pulmonary apoplexy are — 1st. *Recovery.* This takes place only in the first variety; and in its progress the granular arrangement disappears, the margin becomes less defined, the deep red passes into a dull purple, or leaden hue, or into a lighter tint; the hardness diminishes, and the blood-vessels and bronchi become permeable. At last the natural structure re-appears. — 2d. *Suppuration* and *Gangrene* rarely supervene. — 3d. Instead of being absorbed, the blood has been said sometimes to become organised or inclosed within a cyst. Dr. CARSWELL adds, that he has not met with an instance of this. — 4th. When the hæmorrhage is excessive it may be fatal either instantly or in a very short time.

193. *E.* The *Treatment* of Pulmonary Hæmorrhage is fully discussed in the part of the article Hæmorrhage above referred to (See HÆMORRHAGE FROM THE RESPIRATORY ORGANS, §§ 123. *et seq.*)

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LUPUS.—Syn.— *Noli me tangere ; Herpes exedens ; Lupus vorax; Herpes æsthiomenes; Formica corròsiva*, Auct. Var. — *Cancer lupus*, Sauvages.—*Carkinoma facici*, Swediaur.—*Phymatosis lupus*, Young.—*Ulcus tuberculosus*, Good. —*Krebs der wolf*, Germ.— *Dartre Rongeante, Loup.*, Fr. — *Canker, Eating tetter.*

Classif. — IV. Class. IV. Order (*Author*).

1. Defin. — *A chronic inflammation of the integuments, generally of the face, commonly appearing as tubercles of various sizes, singly or in clusters, livid and indolent, followed either by ichorous and phagedenic ulcers—Lupus exedens ; or by extensive changes in the skin, but without ulceration — Lupus non exedens ; the disease being neither febrile nor contagious.*

2. This disease is commonly seated in some part of the face, and has a tendency to destroy or to change both the part in which it occurs and the adjoining parts. It is not always tubercular, one variety commencing in a different form. Although the disease is usually confined to the face, or even to one of its parts, it may attack at the same time,

or successively, several regions of the body. Of the *divisions* of the disease suggested by authors, that by M. BIETT is to be preferred. I shall, therefore, adopt it with only a slight modification as to its *subdivision.*—1st. Lupus with extension of the disease superficially.—2d. Lupus with phagedenic destruction of parts, or with extension in depth; and 3d. Lupus with thickening or hypertrophy of the affected part.

3. I. DESCRIPTION.—i. LUPUS SUPERFICIALIS. —*Lupus with superficial extension of lesion.*—This *species* may be divided into two *varieties*, that without tubercles and that with them.

4. *A. Lupus superficialis non-tuberculosus*, the superficial lupus without tubercles.—This variety attacks continuous surfaces of various extent, and destroys or alters the superficial layers of skin. It occurs principally in the cheeks, and is not attended either by tubercles or by incrustations. The skin acquires a yellowish-red tint, and is slightly elevated, particularly at the margins of the affected part. A slight epidermic exfoliation takes place on its surface, which is smooth, red, or yellowish-red, and shining; and the exfoliation proceeds slowly and without interruption. It is unattended by pain, but the part is somewhat tender when touched, the redness disappearing nearly or altogether on pressure. After the disease has continued for a very considerable time, the skin appears to be much reduced in thickness, the parts more recently invaded appearing red and slightly elevated. As the disease subsides the epidermic exfoliation ceases, the redness declines, but the skin remains thin, atrophied, shining as if seared by a hot iron, or resembling a cicatrix after a superficial burn, and allowing the subjacent vessels to appear through it, as if they were imperfectly covered. The above description of this variety is taken from a case at present under my care, which commenced nearly twenty years ago, in a spot about the size of a bean, at which time I first saw it. M. RAYER believes this variety to commence in a solitary tubercle, and to spread by the formation of fresh tubercles around those which already exist. MM. BIETT, SCHEDEL, and CAZENAVE, however, admit the absence of tubercles in this variety.

5. *B. Lupus superficialis tuberculosus*—*superficial tubercular lupus.*—This variety differs from the former, chiefly in the more or less manifest presence of tubercles in its early as well as in its advanced progress. These tubercles are small, soft, dusky, or yellowish red, and cover a space of various extent. They may remain stationary for a time, varying from a few weeks only to several months, or even years, when they may suddenly become the seat of irritation. Their number then encreases, the intervening spaces appear swollen and œdematous, they coalesce by their bases, their summits ulcerate, and they form a continuous ulcerated surface of irregular shape, and various extent. The cheek may thus be attacked, and the disease may slowly extend over the whole face, destroying the alæ of the nose, and spreading even to the front of the neck. The tendency of this variety is to destroy the surface of those parts on which it appears. It attacks not only the face, but also, although less frequently, the chest, and the anterior aspects of the thighs and extremities, appearing there in continuous patches. The crusts covering the ulcerated surface are thick, rough, and blackish; and when cicatrices form, they are tender, thin, and livid. Tubercles often re-appear in the midst of the cicatrices, and ulceration again takes place in them. When ulceration stops, cicatrisation assumes the form of irregular white bands, stretching from the part where the disease began, and are similar to the cicatrices after burns.

6. ii. LUPUS PHAGEDENICUS.—*Lupus exedens*—*Noli me tangere*—*Lupus with extension in depth.*—This species generally begins with the appearance of one or more small tubercles on the alæ or tip of the nose. These tubercles are soft, smooth, and dusky, or yellowish-red coloured; and their progress is usually slow. This species occasionally commences as a chronic inflammation of the mucous membrane of the nasal fossæ, with swelling and redness of the nose. A thin scab then forms at the opening of the nostrils, and is succeeeded by a thicker one; and ulceration is established, and extends to the alæ of the nose. In other cases, a livid tint, with slight swelling of the point of the nose, is the first indication of the disease. The discolouration increases, and a superficial sore is formed, which becomes covered by a scab, and and the ulcer extends in depth. In some instances, the disease begins in a similar manner in one of the alæ. As the ulceration proceeds a fœtid sero-purulent fluid is poured out beneath the scab, and not only the integuments, but also the cartilage, are slowly and silently destroyed. The nose is sometimes red on the surface only; and occasionally it becomes pointed, sharp, and tapering, the nostrils tending to close. The cartilage at the angle uniting the two lateral halves superiorly, seems then to project, and presents a red tint perceptible through the soft parts.

7. The extent of destruction thus produced varies extremely. In one case, almost the whole nose is destroyed; whilst, in another, the point only is partially injured, as if a portion was removed by a knife. After the ulcers have been arrested and healed, new tubercles occasionally form in or near the cicatrices, the work of destruction recommences, and the whole nose and septum ultimately disappear.

8. The progress of the disease may be slow or rapid—after several years a small portion only of the nose may be lost; and, less frequently, the whole of it may be destroyed within thirty or forty days—*Lupus vorax.*—Sometimes the least interference aggravates and accelerates the malady; and after appearing to advance towards recovery, it often suddenly assumes a more livid hue, and ulceration either recommences or is extended.

9. In rare cases, the septum is destroyed before the outer surface of the nose is implicated. When the ulceration commences in the skin of the organ, the mucous membrane of the nasal fossæ is generally chronically inflamed, and ultimately ulceration takes place in it also, and spreads along it, being occasionally reflected to the arch of the palate and to the gums, which are then deeply furrowed.

10. The tubercles of lupus exedens are sometimes formed in the upper lip near the alæ nasi, or near the commissures of the lips; and the consequent scabbing and ulceration occasion great pain, with destruction of parts. The consequent cicatrisations also give rise to deformity of the lips and mouth.

11. iii. LUPUS WITH HYPERTROPHY OR THICKENING — *Lupus non-exedens serpigenosus*, RAYER — is generally confined to the face, where it appears as an irregular cluster of little tubercles of a dingy red colour, soft, slightly prominent, and indolent. They implicate often a great portion of one or both cheeks or forehead, or even of the whole face. They do not ulcerate at their summits; but their bases appear to extend, and accidental sores sometimes appear at their circumference. As their bases enlarge, the skin swells slowly, and rises so as to fill up the spaces between them. An epidermic desquamation generally takes place from the surface of the tubercles, and is usually most remarkable around the circumference of the clusters where they are most prominent. As the disease continues, the features become much enlarged, puffed, and flabby; and this irregular thickening, with the tubercular swelling and yellowish red and dingy tint, gives the features a hideous appearance, closely resembling that of the true leprosy, with which it was doubtless confounded in the middle ages, more especially when the ears, as well as the alæ nasi and lips, were affected, as they sometimes are. Ulceration rarely takes place in this species; or, if it occur, it is accidental, slight, and superficial; and covered by very thin, laminated, and slightly adherent crusts.

12. This form of lupus sometimes appears on the *extremities* in one or more clusters of flattened lenticular tubercles of a yellowish-red tint, changing into patches of an irregular circular shape, covered by thin furfuraceous scales. These may continue for a long period stationary and small; but they occasionally spread even so as to cover the greater part of a limb. The disease may also commence beneath the ear and on the nucha, whence it may extend to the throat or shoulders, or to the occipital region, which then loses its hair.

13. This disease continues for an indefinite time. The affected parts never regain their natural appearance, even when the disease subsides: the tumefaction of the skin and subcutaneous cellular membrane diminishes, the tubercles shrink and ultimately disappear, but the skin continues thin, smooth, and shining, as in the first variety of the disease (§ 4.).

14. Either species of lupus may be, from the first, a local disease, or unattended by any very obvious constitutional disorder; but I have observed it most frequently in persons of a scrofulous taint; in those who suffer from chronic disorder of the digestive organs, and in females who are hysterical or subject to derangement of the catamenia.

15. During the progress of lupus, several *intercurrent diseases* may appear. The most common of these is *erysipelas*. In lupus with hypertrophy, the supervention of erysipelas may be favourable, the tubercles sometimes disappearing after the attack of that disease; but in other forms of lupus, the occurrence of erysipelas often aggravates the original malady.

16. II. DIAGNOSIS. — Lupus may be mistaken for scrofula, cancer, true leprosy, acne rosacea, syphilitic affections, and other tubercular diseases. — *a.* The sores, tubercles, enlargement of glands, and affections of bones, attending *scrofula*, present certain characters. Scrofulous ulcers extend by the detachment of their edges from the subjacent tissues and the formation of sinuses, in consequence of the softening and suppuration of lymphatic glands, of caries of bones, &c.; but the ulcers of lupus are the effect of a process that consumes the skin and adjoining parts from without inwards.

17. *b.* The red colour, the erythematic areola surrounding the indurations left by the pustules of *acne rosacea*, and these pustules themselves, usually seen in the vicinity of these indurations, sufficiently distinguish rosacea from the indolent tubercles of Lupus. — *c.* The general tawny or lurid hue of the skin, and the form and arrangement of the tubercles, which retain the tint of the surrounding integuments, distinguish the real *leprosy*, or elephantiasis of the Greeks, from lupus with hypertrophy. The tubercles of leprosy appear as small knotty unequal tumours, followed by swellings, which deform the face, these tubercles being commonly disseminated in several parts of the surface of the body. The tubercles of lupus with hypertrophy are, moreover, arranged in a circular form, extending at their margins, which are definitely limited and covered with squamæ; circumstances which do not occur in leprosy. — *d.* The thick incrustations of *Impetigo* are yellow, rough, and not very adherent; those of lupus are of a dark brown colour, thick and very adherent.

18. *e.* The term "*Noli me tangere*" has been loosely applied by HOME, WILLAN, BATEMAN, and S. COOPER, both to the tubercular indolent ulcerations of lupus, especially when affecting the nose, and to the malignant or virulent ulcers which sometimes attack this place, the lower eye-lids, cheeks, or lips,—which ulcers have been described by TRAVERS, LAWRENCE, MACKENZIE, and MÜLLER, as cutaneous cancer, or malignant disease of the face. These *virulent ulcers of the integuments of the face*, which often commence in or near the lower eye-lid, or upper part of the cheek, have been confounded with lupus by M. RAYER; whilst they have been distinguished from that disease by BIETT, JACOB, and BYRON, and from true cancer by these and by several other writers. These virulent ulcers seem to form a connecting link between *lupus* on the one hand, and *cancer* on the other, as respects both their local characters and their constitutional relations. They resemble the former in their seat, in their being strictly local during the greater part of their progress, without affecting the adjoining glands, and in their equally slow destructive course,—whilst they nearly approach the latter in the advanced period of life at which they occur, in their commencing in a dark pimple or scab, in the lancinating pains felt in them at an advanced stage, and in their constant but slow extension; no spontaneous check or arrest of their course taking place when left to themselves, although, like lupus, they may be completely cured by powerful escharotics and alteratives. Dr. BYRON, in a very interesting paper on this kind of ulcer and lupus, has instanced eight cases of the former which occurred at an age more advanced than that at which lupus is usually observed.

19. *f.* Lupus generally commences in several, or in a cluster of tubercles; *cancer* in a single tubercle only. The tubercles of the former are soft and indolent; the tumour of cancer is hard

and painful, is surrounded by a firm base, and is the seat of occasional lancinating pains. Cancerous ulcers are moreover everted and painful; they present a fungous appearance, without the dry thick scabs characteristic of lupus.

20. *g. Syphilis* affecting the face is often distinguished from lupus with great difficulty, especially when the disease is confined to tubercles without ulceration. The tubercles of syphilis are larger and rounder than those of lupus; are of a dusky copper colour, have much less tendency to ulcerate than those of lupus, which are flatter, softer, and covered by their squamæ, partially detached. In the state of ulceration, syphilitic tubercles differ from those of lupus. The syphilitic ulcer is deep, its edges are swollen, sharply cut, and copper-coloured; the ulcer of lupus is of a dull red, and appears confined to the skin. In this latter, the skin is first attacked, then the cartilages, and afterwards, and rarely, the bones; whilst in the former, the disease more frequently begins in the bones, and extends to the skin. The tubercle of syphilis, moreover, is generally attended by pains in the bones, by nodes, ulcers in the throat, palate, &c., and by iritis.

21. III. PROGNOSIS.—Lupus is a most obstinate disease, months, or even many years, elapsing before it yields to treatment. Lupus exedens is seldom subdued until parts have been extensively destroyed. It is, however, less obstinate, and its consequences less severe, if a judicious treatment has been adopted at an early period, especially when its progress is slow. Soft, bluish, or livid cicatrices, surrounded by tubercles of various sizes, indicate a renewal of the disease in its most obstinate form. The establishment of the catamenia, which commonly produces a favourable change in most chronic eruptions in females, has no beneficial influence on this.

22. IV. CAUSES. — Lupus is a somewhat rare disease. It generally commences between the seventh and twenty-fifth years of age; and very rarely after forty. It attacks women more frequently than men, and is more common in country places than in towns. Although it occurs in all constitutions and diathesis, — the robust and the delicate, — yet it is most frequently met with in scrofulous and weakly lymphatic habits. Dr. HOUGHTON states, that in Dublin, where the poor are inured to poverty and want of cleanliness, it is often met with, although some of the worst cases come from country places.

23. V. TREATMENT. — The treatment of lupus is *internal* or *constitutional* and *external* or *local.* — *A. Internal* or *constitutional* means should have reference to whatever disorder may manifest itself in the digestive or other organs, and to the form of cachexia which may be present. Generally those medicines which exert an alterative with a restorative effect are the most beneficial; and which improve at the same time the digestive, the assimilative, and the excreting processes. The more superficial forms of the disease are generally connected with the scrofulous diathesis, and in these especially the treatment advised for SCROFULA is particularly appropriate. In these, as well as in the others, the preparations of *iodine*, especially in the combinations about to be noticed, are of great service.

24. The *chloride of barytes* was recommended by BATEMAN for this disease; but its injurious action on the stomach has prevented its general use; and the *chloride of lime* has been therefore more commonly adopted. One drachm of the solution of this substance may be prescribed in a pint of water, and half an ounce may be taken at first twice, and subsequently thrice or oftener in the day; the dose being also increased gradually. The preparations of *iron* have also been used. The tincture of the sesquichloride, and the iodide of iron are the most beneficial. The sulphate of iron, and chalybeate mineral waters, particularly those which contain carbonic acid gas, are also of service.

25. The *animal oil of* DIPPEL has been much employed on the Continent, commencing with doses of five or six drops, and gradually increasing them to twenty or twenty-five drops. The *decoction of Feltz* has also been advised; but these, as well as most other constitutional remedies, generally fail unless aided by local means, by light nutritious diet and pure air. The preparations of *arsenic*, especially FOWLER's solution, and the *Asiatic Pills* (each containing one-thirteenth of a grain of the white oxide of arsenic and two-thirds of a grain of black pepper) have been found influential in arresting the progress of the disease. The arsenical preparations have likewise been employed in conjunction with alkalies, narcotics, especially conium, and bitter tonics. Small doses of the *bichloride of mercury* given until the gums are affected, or the same substance dissolved in the compound tincture of cinchona, have also been recommended by some physicians. More recently the combinations of iodine with mercury, or *iodides of mercury*, have been resorted to with considerable success; but the most decided benefit has been found by Dr. BYRON and others to have been derived from the internal as well as external use of the "*liquor hydriodatis arsenici et hydrargyri*" of a Dublin chemist, generally commencing with five drops, given three times a day in distilled water, and increasing the dose to ten, fifteen, or twenty drops: this medicine being diluted with an equal part of pure water for external application. The great efficacy of this medicine in lupus has been proved by Drs. GRAVES, HICKSON, STOKES, BYRON, and WHITE, and by Mr. CARMICHAEL and other surgeons; and generally in cases which had withstood iodine, arsenic, and mercury when separately or otherwise employed, than in the form of an iodide of arsenic and mercury.

26. In all cases of this disease, a pure, mild, and dry air; the use of the warm or vapour bath, or of the vapour douche; and strict attention to diet and to the states of the digestive, assimilating, and excreting functions, are requisite. Excess in the use of animal food, or of fermented or distilled liquors, must be avoided during the treatment; and the patient ought to be restricted chiefly to farinaceous and mucilaginous articles of diet; and to the use of whey, or of fresh milk with soda or Seltzer water. During a course of internal medicine, *external* or *local means* should be carefully and constantly applied; and where there is much irritability of the digestive mucous surface, and particularly when the internal remedies above mentioned increase or induce disorder of the digestive organs, these external means should be chiefly confided in, whilst gastric irritation should be allayed by bland and digestible food, taken in moderate quantity.

27. M. Lisfranc advises the treatment of lupus to be commenced with small or *revulsive* venesections—three or four ounces of blood being taken at as remote a point as possible from the seat of disease: and, when the irritation is great, or the patient plethoric, he recommends a recourse to *depletory* bleeding. — Dr. Bateman states that, in three or four cases of lupous tubercles in the face, the muriate of barytes taken internally proved of service.

28. *B.* The *local* or *external means* advised for lupus have been as numerous as the disease has been obstinate. Before ulceration has commenced in the tubercles, particularly in cases of lupus with hypertrophy, local applications which favour absorption should be preferred. Dr. Davies of Hertford, M. Biett, and myself, were among the first to employ *iodine* and its combinations with this view — more especially the *iodides of mercury* and the iodide of sulphur, in the form of ointments. The development of erythema or even of erysipelus by these substances should not be dreaded, as either rather mitigates than aggravates the future course of the disease. In some instances the application of the tincture of iodine more or less diluted, or of the ioduretted solution of the iodide of potassium may be premised.

29. When the application of these, or frictions with ointments containing either of these iodides, are inefficacious, or when ulceration has commenced, recourse should be had to caustics. Of these, the most commonly recommended are, lunar caustic, caustic potass, the butter of antimony, the bis-nitrate of mercury, nitric acid, the animal oil of Dippel, and the preparations recommended by Frère Côme and Dupuytren. But these appear to be inferior in efficacy to the chlorate of zinc, and the liquor hydriodatis arsenici et hydrargyri, introduced by Mr. Donovan of Dublin.

30. When the disease is extensive the application of the more energetic caustics should be limited to a portion only of the surface, each portion of it being touched in succession. If the ulcerated surface be moist and clean, the caustic may be applied to it at once; but if it be covered by scabs, these should be previously removed by poultices. In the indolent and hypertrophied variety, blisters may be applied previously to caustics. The animal oil of Dippel has been much used by continental physicians, as a local irritant, in order to modify the morbid action, particularly when the nose is the seat of the disease. It should be applied by means of a small brush passed repeatedly over the whole of the surface. Dupuytren's powder (consisting of eight or twelve grains of arsenious acid, and an ounce of calomel) is a safe caustic, and has been found efficacious in the slighter cases of the disease. It should not be applied at once to a too large surface.

31. Frère Côme's *arsenical powder or paste* (consisting of white oxide of arsenic, ten grains; sulphuret of mercury, two scruples; animal charcoal, powdered, ten grains) is a powerful remedy, and is most suited to old and obstinate cases; but it should not be applied at once to a surface of greater extent than that of a shilling. It is followed by an erysipelatous inflammation of the surrounding parts. The *bis-nitrate of mercury*, prepared from one, two, or three drachms of the proto-nitrate of mercury, and an ounce of nitric acid, is much employed by M. Biett. It excites erysipelatous inflammation. It may be applied over the ulcers, tubercles, and scars which are soft or purple, or are on the point of breaking out afresh, by means of a small brush dipped in the acid; but it should not be passed over a surface of greater extent than a crown piece. Some scraped lint may then be placed over the cauterised surface, and moistened with the acid. Mr. Plumbe states, he applied the *nitric acid* freely, and produced a healthy sore which readily healed.

32. According to the observations of Dr. Byron and others above referred to, these applications may be superseded by the chlorate or chloride of zinc, and the liquor hydriodatis arsenici et hydrargyri. The former may be applied in its solid form, or rather, the diseased surface should be touched with it, as frequently as the state of parts, and as the effects produced, may suggest. The latter remedy may be applied locally from time to time, whilst it is being exhibited internally. It may be applied in a wash or lotion, with an equal quantity, or more or less of water.

33. During the treatment of this disease, care should be taken to prevent occlusion of the nostrils by the contraction of the scars. This may be done by the introduction of a piece of sponge, duly prepared, which should be persisted in for a considerable time after the cicatrices have formed. Both during the local treatment, and after a cure has been effected, benefit will accrue from vapour or warm baths, and particularly from the vapour douche. In such circumstances, the douches and baths of the Dauphin attached to the Thermes de Maria Therese at Bagnères de Bigorre; or a recourse to the douches and baths at Aix-la-Chapelle, or other places, conjoined with the advantages derivable from changes of air, of climate, of regimen and diet, will generally prove of advantage. It is not improbable that, in these cases, the regimen and diet — the use of pure water and of vegetable and farinaceous food exclusively —so eloquently and argumentatively insisted upon by Dr. Lambe, aided by pure air and regular exercise, may prove of essential service; but as to this I am unable to speak from experience. In all cases, change of air, particularly to the sea-side, and the use of the means most suited to promote the general health, or to remove associated visceral disorder, ought not to be overlooked.

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LYMPHATIC AND LACTEAL SYSTEM

—*Absorbent System. Vasa Lymphatica; Vasa Lymphifera; Système Absorbant*, Fr. *Die Saugadern*, Germ.

1. Pathologists have very generally attributed

not only several organic changes to the lymphatic system, but also various functional disorders. That this system is capable of an *encreased activity* of its functions is probable; but we have no proofs of the circumstance. We merely infer it from the rapidity with which fluids, or even morbid growths, are removed during certain states of the frame, or from the operation of various substances on the body. But this result may proceed from diminished activity of the vessels concerned in the production of those fluids or growths, or from a retardation or arrest of the morbid action which occasioned them, as well as from encreased activity of the absorbent system. Without, however, pursuing this subject at this place, I may remark, that it appears extremely probable that the functions of the absorbent system are controlled by the vital energies of the frame in a similar manner to the other vascular systems — that they may be diminished, augmented, or even otherwise changed, by the varying states of these energies; and that as the healthy are opposed to the morbid functions of a part, so the restoration of the latter to the former state will necessarily be followed by a return also to its original condition and form.

2. It was acutely contended by Mr. HUNTER, that an encreased state of vascular action always co-existed with diminished absorbing function in the parts where the former state prevailed; and that, as vascular action was lowered, the absorbent function became augmented. There are many phenomena which occur during disease, and in the course of various plans of treatment which seem to favour this opinion. But these may be explained in a different manner; and by simply referring them to the different states of vascular action and conditions of the secerning apparatus merely, of the existence of which states we have positive proofs, without calling to our aid an opposite condition of a different series of vessels, of which condition we have no evidence. In order to illustrate this point, let us suppose that we wish to remove an effused fluid or a morbid growth — an ascites or a bronchocele — and we succeed in our efforts. The question is, whether the means employed have produced the desired effect by changing the state of action of the vessels whence the effusion and morbid formation proceeded, bringing back this action to the healthy condition, the absorbent functions remaining unchanged; or by exciting or rousing the absorbing vessels which had become impaired, particularly in the place affected. It is obvious that the former of those effects merely would be sufficient to account for the change produced, without having recourse to the latter; for we can scarcely suppose that the means which would diminish action in one series of vessels would encrease it in another. It is, however, extremely probable that morbid depositions and growths depend not only on a diseased state of the vital actions of a part, manifested chiefly in its capillary, nutritive and secreting vessels, but also upon certain conditions of the circulating fluids; and that the same means which remove these states will seem to have restored the healthy condition of the absorbing vessels, although the functions of these vessels may have been but little affected by them.

3. The following case will illustrate this view. A professional gentleman, well known to several of my medical friends, called upon me, complaining of rheumatic pains in various parts of the body and of disorder of the urinary organs. But his chief complaint was a tumour, as large as his head, on the right side. It was firm, doughy, and apparently fatty. I prescribed the iodide of potassium with liquor potassæ in full doses. In the course of a few days the rheumatic pains had ceased, and the tumour was very much diminished in size; and after a few weeks not a vestige of the tumour remained. In this case the medicinal agents evidently operated by passing into the circulation, and thereby affecting the state of vascular action and nutrition in the tumour, and partly also the chemical condition of the fatty deposit in the cells, thereby rendering it more capable of being absorbed.

4. The influence of the lymphatics in producing disease has evidently been greatly overrated by many pathologists, and particularly by HEWSON, CRUICKSHANK, ISENFLAMM, JOHNSTONE, SŒMMERING, and ALARD. That the functions of this system may be disordered, and that they may, owing to the properties of the fluids and matters which they convey into the circulation, be frequently instrumental in the production of disease, cannot be denied. But that they are often the seat of disease seems disproved by the rarity of their organic lesions. M. ANDRAL states that he has examined the thoracic duct and principal lymphatic vessels in upwards of 600 cases, and found but in very few instances any appreciable changes in the parietes of these vessels.

I. LYMPHATICS, INFLAMMATION OF. — SYN. *Lymphangeitis; Lymphangitis; Lymphatitis; Angioleucitis; Lymphangioitis; Inflammatio vasorum Lymphaticorum. Entzündung des Saugadersystemes; E. der Lymphgefässe*, Germ. *Inflammation des Vaisseaux Lymphatiques*, Fr.

CLASSIF. — III. CLASS. I. ORDER (*Author*, in *Preface*).

1. DEFIN. — *Sharp, burning pain; diffused swelling, tenderness, and heat; red lines manifest in the course of the absorbent vessels, when external parts are affected; symptomatic fever, &c.*

2. Inflammation of the absorbent or lymphatics may be readily confounded with inflammation of the organ in which the inflamed vessels are seated; and there is every reason to suppose that both kinds of inflammation may co-exist, or the one supervene upon the other. There is no doubt that lymphangeitis sometimes co-exists with phlebitis, and that either, especially the former, may give rise to the other; in such cases, one of the diseases, particularly the phlebitis, may mask the other, according to the degree in which either is affected.

3. Lymphangeitis occurs chiefly in superficial parts, and is most frequently seen in the extremities. It much more rarely is observed in large absorbent trunks, and in deeply seated or internal organs. M. ANDRAL found in upwards of 600 dissections the parietes of the thoracic duct inflamed in three cases only. The lymphatics proceeding from the mamma are not infrequently inflamed, particularly in connection with lactation, or consecutively upon inflammation or organic lesions of the organ. Those of the lower extremities are also often affected, either consequently upon abrasions, punctures, &c., or during the puerperal states; but the lymphatics of the upper

extremities are the most frequently inflamed, owing to the liability of the fingers and hand to be injured or contaminated during the discharge of their numerous offices.

4. Lymphangeitis is rarely observed in the internal viscera, probably owing partly to the difficulty of detecting this lesion in these organs, particularly when they are the seat of other changes, or to the readiness with which it may be overlooked. However, I have seen the lacteals inflamed and structurally changed consecutively upon ulceration of the intestines, and in connection with enlarged mesenteric glands; and those of the uterus inflamed in examination of fatal puerperal cases. Similar facts have been recorded by MM. MONOD, TONNELLÉ, DUPLAY, LEE, OLLIVIER, and others. MM. GENDRIN and TONNELLÉ observed in two cases of metro-peritonitis, complicated with lymphangietis, the inflammation extending to the thoracic duct. M. ANDRAL observed the superficial lymphatics of the lungs inflamed in a patient who died of tubercal consumption. There can be no doubt of the not infrequent occurrence of lymphangeitis of internal viscera when they are the seat of ulceration, or when morbid matters are absorbed from them by the lymphatics. In these circumstances either these vessels, or their glands, or both vessels and glands, and even the veins also, are liable to inflammatory action, which may assume either an *acute* or *chronic* form, according to the constitution of the patient and the nature of the causes.

5. i. CAUSES.—*A.* The *predisposing causes* of inflammation of this class of vessels are nearly the same as those which dispose to inflammation of other vessels. A sanguine and irritable constitution and scrofulous diathesis; a weak and delicate conformation; a lowered state of the vital energies of the frame, and the puerperal states, especially the period immediately consequent upon parturition; great losses of blood; previous disease, as scrofula, fevers, syphilis, and a cachectic state of the frame; unwholesome states of the air; confined and ill-ventilated apartments, &c.

6. *B.* The *exciting causes* are mechanical or chemical irritants, especially punctured wounds; the inoculation of noxious, morbid, or putrid animal matters, or acrid substances; the absorption of malignant, ichorous, sanious, or purulent fluids from foul, cancerous, or malignant formations, sores, or from caries and scrofulous or syphilitic ulcers, &c.; the absorption of matter from whitloes, tubercles, anthrax, variolous pustules, and abscesses; the bites and stings of reptiles and insects; abrasions of the cuticle; acrid applications, burns, and scalds; the protracted or incautious inunction of mercurial or other preparations; and the bites of animals. I have seen it caused by the bite of a rat, in a very interesting case attended by Mr. RYAN of Farningham and myself; and by the bites of the cod and ling when taking the hook from their throats, and by the accidental punctures produced by their teeth. In two cases of this kind, which I saw many years ago, the symptoms assumed a very dangerous form. The most common causes are punctured and abrased wounds, and the inoculation of putrid and noxious animal matters. I have seen many instances of it in cooks and poulterers, who had injured their fingers in preparing game for cooking. Punctures or cuts during dissections are also frequent causes.

7. ii. DESCRIPTION.—*A. Symptoms of acute inflammation of the lymphatics—Lymphangeitis acutus.*—The attack may or may not be preceded by chills, or rigors; and it may be characterised by signs either of phlogistic action, or of great depression of the vital powers—by local action and fever either of a sthenic form, or of an asthenic, adynamic, or ataxic kind; the former, however, being generally ushered in by rigors, the latter seldom presenting this symptom. The form of the accompanying fever depends entirely on the nature and combination of the causes and state of the patient's constitution and habit of body; those causes which consist chiefly of mechanical and chemical irritation being generally accompanied by sthenic action, whilst the inoculation of deleterious or poisonous substances, or the absorption of ichorous or morbid matters, especially when occurring during a lowered state of the vital energies and marked predisposition, are always characterised by asthenic, adynamic, or ataxic symptoms.

8. *a.* The *diagnostic signs* of the disease are tensitive, stinging, and burning superficial pain, and tenderness in the course of the lymphatic trunks; accompanied generally with encreased heat and appearances of reddened lines beneath the skin, commencing in the seat of injury, or in an ulcerated or suppurated part, and disappearing about the situation of the adjoining glands, which generally become painful, swollen, or inflamed. These reddened lines or striæ are extremely sensible to the touch, and seem like thin knotted chords placed under the skin. The parts from which the inflamed lymphatics originate, or through which they pass, are generally swollen, tense, and moved with pain and difficulty.

9. *b.* The *constitutional symptoms* are generally those of irritative fever, with various grades of vital power, according to the nature of the exciting causes, and the circumstances peculiar to the patient at the time of their operation. They most commonly, however, assume an adynamic form; or are characterised by greatly increased or irritated vascular action, and depressed vital energy. When internal and deep-seated lymphatics are inflamed, or the principal trunks, as the thoracic duct, &c., the case is extremely obscure. The constitutional affection is generally similar to that now noticed; and the phenomena altogether differ but little from those characterising inflammation of internal veins, or from asthenic inflammation of the internal organs, whose lymphatics are affected.

10. *B. Chronic Lymphangeitis* is rarely met with, excepting in scrofulous habits, and during the course of syphilitic and malignant diseases, when it is generally associated with chronic inflammation and obstruction of the lymphatic glands. Unless the superficial lymphatics are affected, the diagnosis of this form of the disease is extremely difficult. Its existence in many cases even of this description is often merely a matter of inference, and the symptoms accompanying it are seldom distinctly marked. When the lymphatic vessels have presented the appearances on dissection usually resulting from a state of chronic inflammation, the existence of some other organic lesion, particularly of parts whence the diseased

vessels proceeded, has generally been ascertained, as of scrofulous tubercles and ulcers, syphilitic or cancerous ulcerations, caries, elephantiasis, and malignant diseases. Sir A. COOPER found the lymphatic vessels of the chord enlarged, their parietes thickened, with induration of their valves, in a patient who died with chronic disease of the testicle. Indications of chronic inflammation were observed in the thoracic duct of another patient by the same surgeon; and M. ANDRAL has found similar appearances in both the lymphatic and lacteal absorbents.

11. iii. TERMINATIONS AND PROGNOSIS. — The disease terminates, 1st, in resolution; 2d, in organic changes, chiefly limited to the vessels affected without occasioning death; and 3d, by indirectly occasioning death. — *A.* The degree of danger is to be inferred entirely from the nature of the exciting causes, from the condition of the patient's frame anterior to the attack, and from the character of the constitutional symptoms. Unless when extremely slight, and when attended with but little febrile disturbance, it ought always to be viewed as a serious disease; and when the vital energies are evidently depressed, when the disease proceeds from the inoculation or absorption of noxious matters, particularly morbid or poisonous animal secretions, when the pulse becomes very quick, with a dark-brown tongue or with low delirium, offensive secretions, &c. — when these and other symptoms of adynamic or ataxic fever supervene, the danger should be considered great. An increase or diminution of these unfavourable symptoms will of course indicate a similarly modified degree of danger. On the other hand, when all the more violent local or constitutional symptoms abate owing to the treatment employed; or when the causes are not of a very noxious description, nor the system of the patient much injured previously, or the vital energies impaired, a favourable termination may be anticipated.

12. *B.* A *fatal result* is commonly occasioned either by the extension of the inflammation along the vessels to the large trunks or into the veins, or by the introduction of the noxious cause, whatever it may be, into the circulation, and the general contamination of the fluids and soft solids of the body which it thereby produces, or by the combination of the above effects. These results, although occasionally observed in weakened and irritable states of the frame, occur not so frequently as in phlebitis; but still they occasionally take place; and, therefore, our prognosis should be guarded, and the disease considered as one of much importance. It is generally observed that the disposition of the inflammation to extend to the internal lymphatics and veins, and the liability of the morbid matter to be carried into the system, or to contaminate the frame, are great in proportion to the depression of the powers of life characterising the progress of the complaint. When these powers are sufficient to the production of coagulable lymph, by which the extension of the inflammation may be prevented, and the injurious effects of the cause of the disease thereby limited, recovery generally takes place, either by resolution, or by a limitation of these effects to the lymphatics and their glands merely.

13. *C. Appearances after death.* — These are chiefly encreased redness, thickening, an easily lacerated state, the presence of purulent matter in the vessel, and, in rarer instances, ulceration. In most cases, redness of the vessel had given place to the other lesions before death had occurred, and thickening, a dull pearly white state of the coats of the vessel, obliteration of the canal of the vessel and its conversion into an impermeable fibrous chord, are the chief changes. In more chronic cases, these latter changes, or a dilated, knotted, thickened, and indurated state, with remarkable whiteness, are generally remarked.

14. The appearances consequent on inflammation of the *thoracic duct*, in two cases recorded by M. ANDRAL (*Archives Gén. de Méd.*, t. vi. p. 502.), consisted of intense inflammatory redness of the internal surface of the canal, with thickening of its parietes in both instances. In one of them the duct was filled with purulent matter, one of the kidneys having been converted into a purulent sac, and surrounded by large collections of matter. In the other case no purulent matter was found in the duct, but all the adjoining lymphatic glands were inflamed. A similar instance is described by M. GENDRIN. M. ANDRAL states that he has observed, in other lymphatic vessels, similar lesions to those found in the thoracic duct in the above cases. He instances a patient who had died of phthisis, with ulceration of the internal surface of the small intestines, and in whom the lymphatic vessels proceeding from this part of the alimentary canal were similarly altered.

15. *Thickening* of the coats of the vessel may proceed so far as to occasion obliteration of the canal. M. ANDRAL states that the walls of the thoracic duct may be so thickened as to cause a partial or even total obliteration of its cavity.

16. *Obliteration* of considerable lymphatic trunks is occasionally observed as a consequence of inflammation. In many of these cases the obliteration proceeds from inordinate thickening of the coats of the vessel as now stated, but in others the vessel is simply constricted, or reduced to a fibrous chord. M. ANDRAL has recorded a case in which the thoracic duct was altogether obliterated, and a collateral circulation established by a considerable branch which came off from the duct a few lines below the point where it was obliterated, and re-entered it a short distance after it again became permeable. (*Arch. Gén. de Méd.* t. vi. p. 504.)

17. iv. TREATMENT. — The *Indications of Cure* in this disease are — 1st, To diminish local inflammation and irritation; — 2d, To prevent their extension along the vessels to the larger trunks and internal parts, and to fortify the powers of life against the introduction of the morbid cause into the system, or of the secretions from the internal surface of the inflamed vessels. — The *first* indication is best fulfilled by local blood-letting when the inflammation is very considerable. General blood-letting is rarely requisite, unless the patient be very plethoric or robust. I have, however, treated several cases without even local depletion, and the patients have recovered rapidly. The constant application of cloths, kept wet with cold water or with evaporating lotions, has been tried by VELPEAU and others. I have believed that these have increased the pain, and favoured the extension of the disease. More advantage appeared to accrue from warm, emollient, and anodyne applications and fomentations,

In two or three cases the local affection was almost immediately arrested by means of a strong turpentine embrocation applied to it, and of the internal medicines about to be recommended. M. VELPEAU advises mercurial frictions to the part; but these are not only painful, but of doubtful advantage. A similar remark applies to vesicatories, rubefacients, and compression, also tried by this physician.

18. When suppuration has occurred or is about to take place around the inflamed lymphatics or glands, even local depletion may be dispensed with; poultices, and emollient applications, are then most beneficial; and, as soon as matter forms, a free exit should be given to it, in order to prevent its absorption, and a perpetuation or increase of the mischief.

19. The constitutional treatment, whereby the *second indication* of cure (§ 17.) may be fulfilled, is of much importance. After having evacuated, by chologogue and stomachic purgatives, fæcal accumulations and disordered secretions, tonics with alteratives will generally arrest the progress of the disease, when judiciously prescribed, and with due regard to the state of the stomach. I have generally given the decoction of bark, with the compound tincture of bark and an alkaline carbonate, or with ammonia or camphor, or capsicum, with this intention, and with the utmost benefit; but the remedies have been varied according to circumstances; still the principle of practice has been adhered to. Indeed, the same means as are fully noticed in respect of the treatment of diffusive inflammation of the cellular tissue, and of phlebitis, are altogether appropriate to this disease.* (See art. CELLULAR TISSUE, § 34. *et seq.*; and VEINS — *Inflammation of.*)

20. II. ALTERATIONS OF STRUCTURE OF THE LYMPHATIC SYSTEM.

CLASSIF.— IV. CLASS. II. ORDER (*Author*).

21. OTTO and others believe that organic lesions are met with in the lymphatic system, more frequently in the *young* than in the *old*. This opinion, however, applies only to certain lesions, as those connected with scrofula, rickets, and syphilis, and not to those consequent upon malignant or cancerous maladies.

22. i. *The changes more immediately connected with inflammation* have been described above (§ 13.); but it is not improbable that several of those about to be noticed, proceed more or less remotely from changes produced by acute or chronic inflammatory action.

23. ii. The *lesions affecting chiefly the canal or calibre of the lymphatics* are analogous to those found in other circulating vessels.

24. *a. Varicose dilatation.* This change of the lymphatics has been noticed by SCHREGER, TILESIUS, MASCAGNI, SŒMMERING, ATTENHOFER, BICHAT, and MECKEL, in persons who have died of pulmonary diseases, hernia, and dropsical effusions. It seems probable that, as in varicose veins, this state of the lymphatics proceeds from pressure on the trunks in which the dilated lymphatics terminate, or from obstructions to the course of the lymph through them. M. AMUSSAT mentions a case in which the lymphatics of the pelvis and those coming from the groins were varicose, and filled with pus. This state of the lymphatics extended to the thoracic canal. The patient had encysted abscesses in both groins, and died from pneumonia, complicated with cerebral affection. (*Arch. Gén. de Méd.* t. xxi. p. 608.)

25. *b.* Dilatation of the lymphatics has been supposed to give rise to *rupture* of them, and various consecutive changes by MORTON, VAN SWIETEN, HAASE, ASSALINI, SŒMMERING, BRAMBILLA, and others. That rupture may occur on some rare occasions is probable, but it is certainly not so common, nor the cause of so many diseases, as these authors believe. It has not been demonstrated satisfactorily by any of them, although GUIFFART says that he had seen it in one instance. I agree, however, with Dr. BAILLIE in admitting the possibility of rupture of the thoracic duct.

26. *c. Constriction* and *obliteration* of the lymphatics have been believed to occur by HALLÉ and OLLIVIER; and may take place, as in other circulating canals, as a remote consequence of inflammation, or of pressure, or of obstruction of their canals, by organic or other changes.

27. The *thoracic duct* has already been shown to have been occasionally obliterated by thickening or other morbid alteration of its coats. Its canal may likewise be obstructed by a variety of morbid productions either formed in its interior, or conveyed there by absorption. It may also be obstructed by pressure made on it by tumours external to it. When this duct is obstructed or obliterated, the circulation of the lymph is generally kept up by a variety of supplementary passages:—as by, 1st. The great lymphatic trunk of the right side; 2d. By collateral branches arising from the duct below the obliterated part, and entering it above this part; 3rd. By a second duct arising from the receptaculum chyli, and ascending to near the subclavian vein where it unites with the other, entering the vein either along with it or singly; 4th. By large lymphatic trunks opening directly into different parts of the venous system, particularly into the vena azygos, the vena cava, the common iliac, splenic, mesenteric, and other veins, and into the vena portæ; and, 5th. By lymphatics communicating with veins in the interior of their glands.

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* I recently saw, in some respects, a singular case of lymphangeitis with Mr. RYAN of Farningham, that will illustrate the treatment here recommended. A gentleman, about thirty years of age, was bit by a rat in the second joint of the right fore-finger. Inflammation of the absorbents extending from the bite up the arm to the axilla took place. I saw him a few days afterwards (the 6th of October); the arm was then swollen and hard, but the course of some of the inflamed lymphatics could still be traced. What appeared the most singular was, that there was a hard, firm, and almost elastic swelling of the arm of the opposite side, much more marked and general over the whole arm, than in the arm of the injured finger; with some swelling, stiffness, and pain of the lower limbs and joints. Tongue loaded, the pulse quick and soft. The following were prescribed:—

No. 288. ℞ Infusi Gentianæ Comp.:—Inf. Sennæ Comp. āā, ʒvj.; Magnesiæ sulphatis ʒj.; Tinct. Cardamom. Comp. ʒjss. M. Fiat Haustus omni nocte sumendus.

No. 289. ℞ Potassæ Hydriodatis gr. ij.:—Liquoris Potassæ m. xx.; Decocti Cinchonæ, ʒxj;—Tinct. Cinchonæ Comp.; Tinct. Cardamom. Co. āā, ʒj.; M. Fiat Haustus ter quotidie sumendus.

On the 23d, Mr. RYAN informed me that "he continued to improve very much from the 7th until the 17th, when he got cold, which brought on a return of enlargement of the arms and stiffness in the legs." His tongue was loaded, and brown in the centre and towards the root. A full dose of calomel and compound extract of colocynth were prescribed, and directed to be repeated if necessary. The doses of iodide of potassium and of liquor potassæ in the cinchona draughts were increased, and tincture of capsicum added to them. The stomachic aperient was to be continued. These means produced the desired effect.

28. iii. *Vices of texture, of a spurious and malignant nature*, may occur in the lymphatic system. Besides *induration*, *thickening*, and consequent *obstruction* or *adhesion* of these vessels, arising from inflammatory action, and already alluded to, other changes may implicate the parietes of the lymphatics.

29. *a. Fungous productions* have been developed in these vessels. Sir A. COOPER has recorded instances in which these were found in the thoracic duct.

30. *b. Cartilaginous* and *osseous formations* are rarely found in the coats of the lymphatics, although instances are recorded by MASCAGNI, CRUICKSHANK, WALTER, CHESTON, PORTAL, ATTENHOFER, &c., in which these changes were observed.

31. *c. Tubercular degeneration* may take place as a consecutive disease in the parietes of the lymphatics; and has been described by MM. CRUVEILHIER and ANDRAL, as occurring in these vessels in the course of tubercular consumption. In these circumstances the coats of the lymphatics proceeding from tubercular ulcerations were opaque, of a whitish yellow, hardened and thickened; their canals containing tubercular matter. In these instances, however, the tubercular change was very equivocal; for, although the contents of the vessels were of this nature, yet the changes in the parietes of the vessels were similar to those generally consequent upon prolonged irritation, or chronic inflammation.

32. *d. Cancerous, carcinomatous, fungo-hæmatoid*, and *melanoid* degenerations sometimes implicate the lymphatics consecutively, although it is doubtful whether either of these varieties of malignant disease occurs in these vessels primarily, or otherwise than as a consequence of its advanced progress in some part of the body, especially cancer uteri. M. ANDRAL has detailed an interesting case of this description, in which this disease had affected the *thoracic duct* in the following manner: — this duct was considerably enlarged, of a dead white colour, and filled with a whitish puriform fluid. Its internal surface was studded with a great number of round whitish bodies, about the size of peas, which were continuous with the tissue of the parietes of the vessel, and perfectly analogous to the cancerous masses developed in the abdomen and pelvis. In the intervals between these bodies, the parietes of the duct were much thickened, and presented a dead white colour, traversed here and there by reddish lines, and in other points were reduced to a soft pulp of a dirty reddish white. The left sub-clavian vein in which the duct opened freely was distended by a number of dense clots of blood, adhering intimately to the coats of the vein, the inner surface of which was wrinkled and of a dark brown colour.

33. iv. *Morbid contents of the lymphatics and lacteals.* — The alterations presented by the *contents of these vessels* are various, and arise either from a morbid state of the vessels themselves, or from disease in a part in which they originate, — the matters which they contain either having been formed in them, or merely introduced by absorption. — *a. Blood* has been very rarely found in the absorbents in a pure state. Professor LIPPI, (*Journ. des Prog. des Scien. Méd.* t. iii. p. 102.), however, states that he has frequently observed, in cases of pneumonia and hepatitis, blood in the lymphatics proceeding from these viscera; and he conceives, that the presence of this fluid in the lymphatics to any considerable extent is incompatible with the continuance of life. M. SANSON has recorded the case of fatal erysipelas, in which the greater number of lymphatics seated in the pelvis and in front of the spine, as well as the throracic duct, were distended by blood, which, on being analysed by M. BARRUEL, was found perfectly pure. (*Archives Gén. de Méd.* t. xxi. p. 628.) MASCAGNI relates several cases of sanguineous effusion from the pleura and peritoneum, where the lymphatics ramifying on these membranes were distended with blood. This is confirmative of the remarks of Professor LIPPI. The lymph contained in the thoracic duct in the healthy state frequently presents a rose-tint, and M. MAGENDIE states that it presents this tint in a marked manner after an animal has been kept long fasting.

34. *b. Pus* has been found in the lymphatics by DUPUYTREN, VELPEAU, SŒMMERING, DUMAS, and others. M. ANDRAL has seen the thoracic duct filled with pus in a woman who had suppuration of one of the veins; the coats of the duct being red and friable. M. VELPEAU found pus in the lymphatics of the lower extremities in a case of phlegmasia dolens; and M. DUPUYTREN observed it in a case of abscess in the leg. SŒMMERING, GENDRIN, and ANDRAL, have found pus in the lymphatics, arising from ulcers of the intestines; and MASCAGNI in the lymphatics of the lungs in phthisical subjects. Dr. LAUTH states that the lymphatics up to the thoracic duct were filled with a sanious matter, in a case of gangrene of the lower extremities, similar to that existing in the gangrened part.

35. *c. Tubercular matter* of a curdy appearance has been not infrequently found in the lymphatic vessels proceeding from the ulcerated intestines of phthisical patients. M. ANDRAL, M. CRUVEILHIER, GENDRIN, OTTO, and others have adduced numerous cases of this description. In these cases the lymphatics appeared like so many knotted white chords passing from the intestines towards the mesentery. This matter also has been found in the inguinal, pelvic, and superficial pulmonary lymphatics, and in the thoracic duct. M. ANDRAL refers to a case wherein it existed in all those vessels.

36. *d. Bile* has been stated to have been detected in the lymphatics of the liver, by MASCAGNI and SAUNDERS. M. ANDRAL has not observed this; but he has seen a remarkably yellow tinge in the lymph contained in the thoracic duct of icteric patients. *Milk* has also been found in the lymphatics, by SŒMMERING and ASSALINI, in females who have died in the puerperal states.

37. *e. Calcareous matter* has been found in the lymphatics by PONCY, ASSALINI, CHESTON, SCHERL, ATTENHOFER, SŒMMERING, and LAUTH. The last-named physician states that, in a case of caries of the iliac bones, he found the lymphatics of the pelvis filled with osseous matter.

38. *f.* The molecules of *cancerous, medullary*, and *melanoid* productions, have been found in the lymphatics proceeding from the seat of these malignant diseases by most of the authors mentioned above, as well as by others.

39. III. LYMPHATIC GLANDS — Diseases of. — Lymphatic ganglions are composed of, 1st, lymphatic vessels variously convoluted; 2d. Fine cellular tissue uniting those convolutions; 3d. Of a fibro-cellular membrane or capsule enclosing the foregoing; and 4th. Of blood-vessels supplying the gland, both entering it along with the lymphatics and ramifying in its capsule. The nerves cannot be distinctly traced, and consist chiefly of such as accompany the distributions of the arteries.

40. The lymphatic glands are more susceptible of disease than the lymphatic vessels, and hence are more frequently the seat of it. This is owing to their organization and functions; morbid matters which fail of making an impression upon the trunks or ramifications of these vessels, not infrequently inducing inflammatory or other changes in their glands. I shall *first* notice inflammations of the lymphatic glands, and afterwards the chief organic lesions to which they are liable.

i. Inflammation of Lymphatic Glands. — Synon. — *Lymphadenitis*, Hildenbrand; — *Adenitis Lymphatica; Adénite Lymphatique*, Ollivier.

Classif. — III. Class. I. Order (*Author*, in *Preface.*)

41. Defin. — *Swelling, hardness, pain, and tenderness in the seat of some lymphatic gland, frequently attended by chills and followed by heat, by increased pain on motion, by febrile reaction, often by redness of the surface, when superficial glands are affected, and suppuration.*

42. The lymphatic glands are often the seat of inflammation, and, although those which are more superficial, or have more or less intimate anatomical relations to superficial parts or to the extremities, are most frequently affected, those which are more deeply seated, or which are altogether internal, are also occasionally inflamed; the disease, however, seldom admitting of recognition in the latter situations during the life of the patient.

43. *A.* Symptoms. — When a lymphatic gland becomes acutely *inflamed* — *Lymphadenitis acuta* — it is swollen, hard, painful, and tender to the touch. Chills or even rigors may be felt at the onset, and there is generally symptomatic fever, varying in type or character with the constitutional powers and the cause of the affection. The surface of the seat of the disease is usually warmer than natural; sometimes it is reddened and a tumour is observable, particularly as the inflammation advances and when the gland is not deeply seated. The pain usually encreases or becomes sharp; and the inflammatory action extends to the surrounding cellular tissue, rendering the swelling less circumscribed, as well as greatly encreasing it. As the skin is more distended, it is more reddened, or even livid. In the course of a few days the tumefied part becomes softer in one or more points, and a more or less distinct, superficial or deep-seated, but circumscribed, fluctuation may at last be detected, the pain having even become more pulsating. A spontaneous opening at this part, as described in the article Abscess, or puncture of it, gives issue to purulent matter, varying, in quantity and character, with the size and maturity of the abscess, and with the constitutional affection. After the discharge of matter, the infiltration of the surrounding cellular tissue is removed, the sanguineous engorgement and inflammatory action in the gland subside, and the aperture closes.

44. The *terminations* of acute lymphadenitis are resolution, suppuration, and chronic induration or enlargement. — *a. Resolution* is not infrequent, and may be expected when the disease remains for a few days stationary, or does not extend to the surrounding cellular tissue, the tumour remaining circumscribed and moveable. When the adjacent cellular tissue is affected, resolution very rarely occurs; and, when the skin covering the part is red and the subjacent cellular tissue much engorged, it is not to be expected. — *b. Suppuration* follows the circumstances just mentioned, especially when the surrounding cellular tissue is much infiltrated from extension of inflammation to it. If suppuration be limited to the gland, the tumour is circumscribed, moveable, and feels elastic or fungous; and when the integument covering the gland is divided, the tumour formed by it partially protrudes from the opening, and consists of the inflamed, friable, reddened gland infiltrated with purulent matter, which, with the increased injection of its vessels and infiltration of serum, occasions its enlargement. In many instances, the surrounding cellular tissue is chiefly inflamed, and the suppuration is limited to it — one or more points, particularly externally or around the affected gland, without, however, assuming a very regular or circumscribed form. The gland itself is then not so swollen as in the former case, and presents, upon being cut into, a more regular red, or greyish-red, tint, and is firmer and not so friable or soft. In other instances suppuration takes place both in the gland and in the surrounding cellular tissue, at one or more points.—*c. Induration* and *enlargement* are chiefly observed when the *acute* has passed into the *chronic state* of the disease. The lymphatic glands, during inflammation and its several consequences, present the same changes and the same *post mortem* lesions as have been fully described in the articles Inflammation and Abscess.

45. *B. Chronic Inflammation of Lymphatic Glands* — *Lymphadenitis Chronica* — is as common a disease as the acute. It often follows this latter, and frequently supervenes in the course of chronic diseases, or of irritation of parts from which lymphatic vessels passing through glands arise, as ulcers, chronic cutaneous eruptions, &c. It is, however, most common in scrofulous constitutions, wherein it may occur either as a primary affection, or as a symptomatic or consecutive malady of other antecedent changes or lesions. (See art. Scrofula.)

46. When the chronic follows the acute disease, the acute symptoms subside gradually, either before suppuration has commenced, or after it has taken place to a small extent, or in a limited portion only; and slight pain and heat, with swelling and hardness of the gland, continue until ultimately the latter only remain. When chronic lymphagenitis occurs primarily, the gland swells gradually, becomes hardened, and slightly pained, particularly on pressure and exertion. The skin retains its colour, and the surrounding cellular tissue is either unaffected or slightly affected, the enlarged gland being moveable. Symptomatic fever is rarely present, or, if present, in a very slight degree. No change may

occur, locally, for an indefinite period, unless some local or constitutional influence affect the engorged gland.

47. The *consequences* or *terminations* of chronic lymphagenitis are, resolution, the acute state, and suppuration. — *a. Resolution* takes place slowly or imperfectly; and, although inflammatory engorgement may be more rapidly removed, the infiltrated lymph, or deposit in the gland, is very slowly removed. — *b.* An *acute state* of vascular action may be induced by external injury, by increased irritation affecting the related lymphatics, or by too great exertion of the neighbouring muscles or parts. When this change occurs, the usual phenomena of an acute attack (§ 43.) are observed.—*c. Suppuration* is generally a consequence of the acute state of the disease following the chronic. When suppuration is about to take place, the surrounding cellular tissue becomes infiltrated and swollen, and the gland more tumefied, less hard, and less moveable, the formation of matter in these cases taking place around, and rarely within, the gland.

48. *C. Specific Inflammation of Lymphatic Glands — Lymphadenitis specialis.* — Lymphadenitis may occur in the course of various malignant and constitutional maladies, and present, in these circumstances, either an acute or chronic form. — *a.* It may appear in an *acute form*, in the course of *malignant* or *putrid continued fever*; and it is always distinctive of *plague*, or pestilential fever. In these circumstances, the affection of the glands is of an extremely asthenic or disorganizing nature. It also occurs consequent upon the inoculation or absorption of various contaminating and septic poisons, and of putrid animal matter or fluids, where it assumes more or less of the same asthenic characters. — *b.* It generally assumes, or passes from the acute into, the *chronic form*, when produced by *syphilitic* ulceration or absorption. The continuance of *carcinomatous* or other local malignant disease induces a chronic form of enlargement and alteration of the lymphatic glands, which can hardly be attributed to inflammation, but either to the deposit of morbid matter in the substanceof the gland, or to the accumulation of it in the extreme ramifications of its vessels, this matter being identical with, or similar to, that present in the primary seat of disease, and altering the size, functions, and appearances of the gland. Of other changes and more remote consequences of diseases of lymphatic glands, further notice will be taken in the sequel.

49. *D.* CAUSES.—The *causes* of Lymphadenitis are diversified. — *a.* They generally operate either through the medium of the constitution, or locally; and in many cases, the local causes are enabled to produce their effects on the gland, owing to a *state of the constitution* predispossng it to the affection. In most of the symptomatic and specific forms of lymphadenitis, the disease is chiefly owing to antecedent changes in the state of the circulating fluids and of the vital cohesion of the soft solids generally. In such circumstances, the local agents, whether merely irritant, or also contaminating, readily produce disease of glands corresponding to the primary seat of irritation or of inoculation.

50. *b.* The *local causes* are those — 1st, which act directly on the gland, as contusions, wounds, and other injuries; and 2d, those which act through the medium of related absorbent vessels. Numerous causes act in this latter way; punctures, abrasions, injuries, &c., may inflame the insorbents, and the inflammation may extend to the nearest glands to which these vessels proceed; or the local injury may be so slight as hardly to be remarked, and yet the gland corresponding to the part may become inflamed, the vessels communicating with the one and the other being apparently unaffected. Various morbid matters may even be inoculated in this way, and the matters may inflame these glands either after the vessels have been affected, or without having sensibly involved the lymphatics communicating between the seat of injury and the gland. Thus putrid or morbid animal matter may be introduced without producing any obvious local disease until the glands are affected. Certain maladies, also, which commence locally, do not produce inflammation of the lymphatic vessels conveying the morbid matter, whilst they generally affect these glands to which the vessels proceed, the absorbed matters inflaming these glands but not the trunks of these vessels. This is illustrated by the phenomena of syphilis and cancer.

51. *E.* TREATMENT.—*a.* The treatment of *acute lymphadenitis* should depend very much upon the state of the constitutional powers. When the disease assumes a purely *sthenic* character, local bloodletting freely prescribed, and promoted by the usual means, is always necessary; but, in order to procure the resolution of the disease, it should be resorted to early, and before the integuments have become red, or other indications of suppuration have appeared. M. VELPEAU has advised the application of blisters to the surface of the part, in order to procure resolution; and subsequently poultices or mercurial ointment. In strong or plethoric persons, these means should follow copious local depletion. If the disease appears in a cachectic state of the system, or with signs of *asthenia*, local depletions are rarely of service. In these cases, particularly as I have frequently seen them consecutively upon scarlet and other fevers, alteratives in conjunction with tonics have proved most beneficial, tending to limit both the extension of the disease and the consequent amount of suppuration, which, in these circumstances, can rarely be prevented; but, even in these, the amount of disease and its duration will be greatly lessened by the exhibition of the liquor potassæ, or BRANDISH's alkaline solution, with or without the iodide of potassium, in the decoction of cinchona and tonic tinctures, or in the preparations of sarsa. At the same time, the secretions and excretions should be promoted by means of alterative and chologogue aperients, and stomachic purgatives.

52. If suppuration appear inevitable, poultices should be applied, and as soon as any fluctuation can be detected, an opening should be made, and the discharge of matter promoted by a continuance of the poultices; the constitutional means being prescribed with strict reference to the state of general and local action, and to the functions of the abdominal viscera. In these cases, as well as in many others, the principles of treatment fully developed and illustrated in the articles ABSCESS and INFLAMMATION should be adopted.

53. *b.* The *treatment of Chronic Lympha-*

denitis consists chiefly of the application of leeches in some cases, and the occasional repetition of them, of the exhibition of alteratives and tonics, as liquor potassium, iodide of potassæ, the iodide of iron, sarsa, cinchona, &c.; of frictions with resolvent or deobstruent ointments and liniments, and of salt-water bathing, &c. In all cases of the chronic disease, particularly in scrofulous persons, and of the acute, after the active symptoms have been subdued, change of air, alterative mineral waters, a cautious use of the iodides in small doses, or the combination of certain of them with the liquor potassæ, sea-bathing, and sea-voyaging, change of climate, the tepid shower-bath or douche, a moderate or limited use of animal food, with a sufficient amount of vegetables and farinaceous diet, and a very liberal use of new milk, whey, or fresh buttermilk, as a common beverage, will generally secure recovery and prevent future attacks.

54. *c.* The *specific states of Lymphadenitis* require few remarks. When the disease assumes an *asthenic* or malignant nature in connection with similar constitutional maladies, the powers of the system should be promoted, and energetic general and local means should be employed in order to resist the progress of the local mischief. Powerful tonics, antiseptics, and alteratives should be employed, according to the symptomatic relations of the disease; but it is unnecessary to particularise these remedies at this place, as they are fully noticed in the articles ABSCESS (§ 62.), INFLAMMATION (§ 238. *et seq.*), PESTILENCE, SCROFULA, and SYPHILITIC CACHEXIA.

ii. STRUCTURAL CHANGES OF LYMPHATIC GLANDS.

CLASSIF. — IV. CLASS. II. ORDER (*Author*).

55. These changes are chiefly seated, 1st, in the cellular tissue uniting the convolutions of the lymphatics; and, 2d, in the lymphatics themselves; and occur most frequently in infancy and childhood, when these glands are most developed, and their functions most active. Dr. BOEKER considers that, in diseases of these glands, the cellular tissue uniting the convolutions of the lymphatics are most frequently affected, and that there is seldom obstruction of their canals, as he has found injections to pass freely through them.

56. *A. Simple enlargement* of these glands is often observed. It generally arises from causes not originally seated in the glands, but from irritation at the origin of the lymphatics passing through them, or from the irritating nature of the fluids which they contain. Thus we perceive painful swellings of the glands of the groin or arm-pit follow punctures or lacerations of an extremity, or the inunction of mercury; and a similar effect is produced on the glands under the jaw, on those adjoining the trachea, and on the mesenteric glands, from sores in the mouth, inflammation of the bronchial lining, and from irritation of the digestive mucous surface, respectively. When the irritating cause is not of a specific or poisonous nature, the effect upon the glands is merely that of irritative enlargement, or of healthy acute inflammation, or the latter following the former change. But when a specific cause of a noxious or poisonous nature has affected the absorbents or been conveyed into the lymphatic circulation, a specific and more noxious effect is the result. On each of these I shall offer a few remarks.

57. *B. Inflammation* is frequently met with in these glands, in the acute, the chronic, or intermediate states. (See § 42. *et seq.*) When thus affected they are more or less red, tumefied, and readily broken down. In the more chronic state of inflammation they are considerably enlarged, hardened, and either become colourless or acquire a darker tint. Inflammation, in its more active forms, is often followed by the formation of purulent matter, which either infiltrates the tissue of the gland, giving it a dirty grey colour, or is disseminated in small distinct drops, or is collected into an abscess. When this last occurrence takes place it often occupies the whole of this gland, destroying its parenchymatous structure; its envelope alone remaining and forming the cyst to the abscess (§ 45.).

58. *C. Scrofulous enlargement and inflammation* are generally of a chronic kind; the gland swells and softens, and occasionally becomes redder; and, although the suppuration does not rapidly supervene, yet this termination is frequent, is peculiar in its nature, and takes place, in many cases, without any signs of inflammation of the gland itself, although the surrounding cellular tissue and the skin become subsequently inflamed and softened, followed by perforations, through which the scrofulous secretion from the gland is evacuated. This form of disease is generally unattended by pain or tenderness, and the cellular tissue and skin are affected. As the gland softens, a particular part or parts, generally about its centre, are converted into a sero-albuminous fluid; and this change invades more or less of the gland, extending to the surrounding texture, occasioning perforation, and the discharge of a serous fluid containing curd-like matter. On examination, the gland presents the appearances described in the following paragraph (§ 59.); and sometimes merely a more friable state of its structure, with cells or cavities containing a partly serous and partly puriform fluid, and a white, albuminous, or curdled matter (see article SCROFULA). In some rare cases, scrofulous glands when inflamed become rapidly *disorganised;* sloughing of the cellular texture surrounding them and of the skin takes place; the gland assumes an unhealthy ash colour, and is at last expelled either in shreds and pieces, or in a sphacelated mass. This change has been noticed, by CRUICKSHANK and CRAIGIE, to occur in scrofulous persons, generally about the bend of the arm, and is evidently depending on a debilitated and cachectic state of body.

59. *D. Tubercular matter* is found very frequently in the lymphatic glands, and generally either infiltrated and disseminated through their tissue, or collected into one or more masses of various sizes. In respect of the production of this matter, the question is, whether it is, or is not, the result of inflammation. The developement of tubercle subsequently to inflammation is, as remarked by M. ANDRAL, undoubtedly exhibited in lymphatic glands; but though in many cases the tuberculated gland presents unequivocal marks of antecedent congestion or inflammation, it is not the less true that in several instances there exists no evidence whatever of the formation of the tu-

bercular matter having been preceded or accompanied by any vascular injection.

60. Tubercular matter, as found in the lymphatic glands, has generally been viewed as the product of secretion, not necessarily of inflammatory secretion, but rather itself occasioning the inflammatory appearances frequently associated with it. M. ANDRAL observes respecting this point: perhaps it may yet be considered as simply the result of an alteration of the lymph itself, either spontaneous, or caused by a morbid condition of the lymphatic vessels, or perhaps resulting simply from its stagnation caused by some mechanical obstacle to its circulation through the lymphatic plexus. I am disposed to adopt a part of this explanation, and to infer, that the tubercular matter proceeds simply from diminished vital energy of the glands affected, occasioning stagnation of the circulation through the convolution of lymphatics; and consequently a morbid state of the lymph and all the other phenomena attendant on tubercular formations, as inflammation, scrofulous suppuration, &c. alternately supervene.

61. *E. Pestilential disease of lymphatic glands.* (§ 47.) From the first twelve hours to the seventh or eighth day of plague, the glands in the armpits and groins become enlarged, and give rise to an open sore, accompanied with sloughing, and the discharge of a foul, dirty-coloured fluid. The texture of the gland seems softened, of a dark grey, greyish brown, or brownish-red colour; becoming rapidly disorganised and wholly destroyed, especially in the fatal cases. This state of the glands is often associated with carbuncles, to the irritation occasioned by which it has been imputed. But this is evidently not the case, as the lesion of the glands often commences as early as the formation of carbuncles, or even precedes it. Both lesions evidently depend upon the same cause, namely, to a certain change of the vital condition of the parts affected, deranging the capillary circulation in the one, and the lymphatic circulation through the glands in the other, and changing the states of the fluids circulating through each system of vessels respectively, and inducing the ulterior changes characterising both.

62. *F. Disease of the glands from the absorption of noxious matters* is not infrequent. The effect produced by these matters on the glands varies very considerably, owing — 1st. To the nature of the injurious cause; and 2d. To the constitution and state of the vital energies of the patient at the time. *Phagedenic bubo* is one of the most common effects proceeding from this source. It is occasioned by the syphilitic poison, or by repeated or too long continued courses of mercurial inunction, especially when acting on an unhealthy state of the body. Hence these noxious matters excite inflammatory action of an asthenic or diffusive kind, in the gland, extending to the capsule, and surrounding cellular structure; and these parts become painful, hard, somewhat hot, and of a brownish red. The skin passes from this tint to a dirty greyish brown, loses its vitality, and, with the cellular tissue underneath, alternately ulcerates and sloughs. The glands, however, still remain undestroyed, generally enlarged, and of a brownish-red or purple colour, and evincing a very low grade of vitality, until the destruction of the surrounding tissues isolates them more or less completely, when they are thrown off in the state of slough.

63. *G. Enlargement and destruction* of the glands sometimes follow the *inoculation* and *absorption* of putrid or poisonous animal secretions or fluids, as in wounds from dissection, and the bites of poisonous reptiles. In cases of this kind, the noxious matters contaminate the lymph circulating through the gland, the vitality and circulation of which become greatly injured, and rapid disorganisation is thereby occasioned, extending to the adjoining structures, and in the course of the lymphatics departing from thence. In cases of this description the gland rapidly softens and enlarges, loses its healthy colour, and assumes a dark and foul appearance, and ultimately sphacelates either in part or altogether.

64. *H. Induration* of the lymphatic glands is frequently met with in consequence either of repeated attacks of chronic inflammation alternating with partial resolution, or of the continued irritation in a part whence the lymphatics passing through the gland originates. This disease is not infrequent in strumous habits, and is characterised by a very slight, or entire absence of, pain in the gland. When examined with the scalpel the gland is enlarged, hardened, so as often to grate when divided, and presenting a whitish tissue, with a very few red vessels, the remains of its natural vascularity.

65. *I. Schirrous induration* may proceed from the same causes as simple induration, particularly in persons advanced in life; or from schirrous disease in the part in which the absorbents of the gland originate. When divided, the gland is observed to be very slightly vascular — less so than natural; very much hardened, of a bluish grey, or greyish white colour, somewhat elastic, and consisting of gelatinous and amorphous matter traversed in every direction by dense cellular or fibro-cellular tissue, of a lighter colour than the matter traversed by it. This lesion is often accompanied with a dull pain, which is sometimes exasperated, in the substance of the gland. (See art. CANCER.)

66. *K. Cancer* is met with in the lymphatic glands, but it very rarely occurs primarily; it is commonly consecutive of this malady in adjoining or related structures. It assumes in the glands similar forms to those presented by it in other parts. It is *characterised* by exacerbations of pain in the enlarged and hardened gland, by the absence of tenderness, the very chronic state of the disease, an unhealthy or cachectic habit of body, and mature or advanced age. The gland when divided is vascular, indurated, of a reddish brown hue, and its tissue is converted into a dense fibro-cellular substance with cells containing a granular amorphous matter. When the gland passes generally or partially from this state to that of softening and ulceration, with an acrid, foul secretion, irregular fungous excrescences springing from the disorganised surfaces, *carcinoma* of the gland has taken place. (See CANCER.)

67. *L. Fungus Hæmatodes* of the lymphatic glands is rare. Mr. WARDROP observed this change in the mesenteric glands. I met with one case of it in the absorbent glands in the groin, in a boy of about thirteen years of age, who had a number of hæmatoidal tumours in different parts of his body. The structure of these glands was

similar to that described under the article Fungo-Hematoid Disease).

68. *M. Melanotic depositions* sometimes take place in the lymphatic glands. But this lesion should be distinguished from the dark discolouration which is occasionally met with, without any organic change. (See Melanosis.)

69. *N. Calcareous and osseous deposits* in the lymphatic glands have been described by Cruickshank, Baillie, Goodlad, Dupuy, Rayer, and Andral, and are stated to occur most frequently in the tracheo-bronchial glands; and in persons advanced in life. I have, however, met with this change previous to puberty, both in the bronchial and mesenteric glands; and M. Andral mentions a similar case. This pathologist refers to cases which occurred to him and to M. Reynaud, in which the presence of bony and calcareous deposits in the glands was coincident with destruction of some of the bones, leading to the inference that the calcareous phosphate which had been absorbed from the seat of disease in the bones had been deposited in the lymphatic glands. In cases of this description the calcareous deposits are frequently not limited to the glands, but are found also in the lungs.

iii. Lesions occasioned by Diseased Lymphatic Glands.

70. These glands, when enlarged or otherwise diseased, may derange the functions or structure of adjoining parts, either communicating irritation or occasioning mechanical pressure, or interrupting the circulation of lymph in the lymphatics, and causing swelling of the parts whence they arise. The bronchial glands have been found enlarged so as to impede the passage of air into the lungs, and even to give rise to atrophy of the portion of lungs the functions of which had been obstructed. They may also occasion inflammatory irritation of the part of the bronchus pressed upon, leading to perforation; and, if the enlarged gland contain pus or tubercular matter, these may be evacuated into the bronchial tube and excreted; and, even recovery may take place, more rarely, however, if the gland contain tubercular matter, inasmuch as the glands seldom contain this matter unless it exists also in the substance of the lungs.

71. Enlarged lymphatic glands in the vicinity of the pylorus may compress the passage so as to occasion a great proportion of the symptoms attendant on scirrhus of this part. Or they may compress the hepatic duct and occasion jaundice; and they may similarly affect the cystic and common ducts. A case occurred to me in 1821, in which the common and pancreatic ducts were so compressed by a cluster of enlarged lymphatic glands as entirely to obliterate their canals: the patient died jaundiced, and the gall-bladder and hepatic ducts were enormously distended by dark-coloured bile. M. Andral has seen the gall-bladder itself obliterated by these glands. In some cases, the ureters have been found obstructed by pressure sustained from them, and even the vena cava has been so compressed by them, and its circulation so impeded, as to occasion great œdema of the lower extremities.

72. Chronic inflammation and induration may interrupt the circulation of lymph through them, and hence occasional swelling or œdema of the parts from which they arise; but this does not so frequently occur from simple induration or scrofulous inflammation or deposits as from schirrous induration or malignant deposits.

73. When the glands of the axilla and parts adjoining become indurated and enlarged consecutively upon cancer mammæ, they may be so impervious to the transmission, by the lymphatics, of lymph and serum from the arm, as to cause remarkable swelling and œdema of it. Enlargement and obstruction of the glands of the groin may have a similar effect upon the lower extremities, — an effect which I have seen on several occasions, in both the upper and the lower limbs. Some years ago I was consulted by a medical gentleman on account of a tumour, seated internally above the abdominal ring of the right side, which was large and painful. The testicle on that side had never descended. A treatment suitable to inflammatory enlargement of the gland — namely, local blood-letting and antimonials, followed by the iodide of potassium, with liquor potassæ, &c. — was prescribed, and he derived benefit from it. A considerable time afterwards I was again consulted by him. The tumour had returned; the lymphatic glands in the groin of the same side were greatly enlarged and inflamed, and the right thigh and leg were swollen and painful, resembling the state of the limb in phlegmasia alba dolens. In this case there were manifestly inflammatory enlargement of the undescended testes, and of the glands in the groin, with interrupted circulation through the latter, occasioning infiltration of serum and lymph in the thigh. The enlarged testes and lymphatic glands probably also pressed upon the veins so as to impede the return of blood through them. (See art. Scrofula.)

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MALARIA. — See Endemic Influences.

MAMMA, DISEASES OF THE. — As these diseases come chiefly under the cognizance of the surgeon, a brief notice of them only will be required in this work. Diseases of the breast are either *malignant* or *non-malignant*: this distinction, however, must only be adopted as a general one, for tumours which have long existed in an indolent state, occasioning no serious symptoms, may become malignant under the influence of constitutional disease, of the changes accompanying the cessation of the menses, and of depressing passions of the mind. Sir A. Cooper, admitting this limitation, distributes diseases of the breast into three classes: — "1st. Those which are the result of common inflammation, acute or chronic; — 2d. Those which arise from peculiar or specific action, but which are not malignant, and do not contaminate other structures; — 3d. Those which are not only founded on local, malignant, and specific actions, but are connected with a peculiar and unhealthy state of the constitution."

2. M. Velpeau divides diseases of the Mamma into — 1st. *Inflammations* and their consequences; and 2d. *Tumours* of various kinds. Both these divisions are defective; for there are affections of the mamma, which consist neither of inflammation nor of tumour but which are functional and nervous. These have hardly received sufficient attention from systematic writers; indeed, with a few exceptions, they have not even been noticed; and, when noticed, but imperfectly. The circumstance of their being very commonly sympathetic, either of disorder of the uterine functions, or of pregnancy, should not excuse this neglect, since they do not always depend upon this cause; and even when they are so associated, they are often the most prominent and distressing part of the disorder. I shall, therefore, divide the affections of the mamma into — 1st. Functional and painful disorders; — 2d. Inflammations and their immediate consequences; — 3d. Tumours and morbid growths not primarily or generally malignant and contaminating; — and, 4th. Tumours or formations of a malignant and contaminating nature.

3. I. Functional and painful Affections. — The *functions* of the mamma may be either imperfectly or not all performed, at the period when they are destined by nature to be discharged, or, after they have commenced at this period, they may suddenly and entirely cease. These functions may likewise be performed in an excessive manner, either absolutely or relatively to the constitutional powers of the nurse. With the exception of *deficiency and suppression of the milk*, and of *painful affection of the mamma*, the other functional disorders of this organ are treated of in the article Lactation.

i. Deficiency or Suppression of the Milk. — Syn. *Agalactia*, αγαλακτια (from α, priv., and γαλακτος, milk). *Agalactie*, Fr. *Der Mangel un Milch*, Germ.

Classif. — I. Class. II. Order (*Author*).

4. Defin. — *The non-appearance or the suppression of the function of the mamma, at the period intended for the performance of it.*

5. After parturition, the *function* of the mamma is generally discharged with more or less activity; but it may not be manifested; or, having been performed for a time, it may prematurely or quickly cease. This non-performance of the office of the organ may be either *primary*, or *consecutive* and symptomatic, more frequently the latter.

6. *A. Primary agalactia* is generally *caused* by powerful mental emotions; by constitutional debility; by want, misery, and starvation; and particularly by cold applied to the body generally, or to the mammæ more especially, in connection with inanition. When it proceeds from mental emotions, the disorder is often only of temporary duration; but when it arises from other causes, it is generally permanent.

7. *B. Sympathetic agalactia* is often consequent upon fever and inflammations occurring after delivery, or at any period of lactation, more particularly upon peritonitis, hysteritis, and excessive discharges, &c. When these diseases appear soon after parturition, the mammæ do not become full and enlarged, as usually observed at this period, but are flaccid, and secrete little or no milk; the elements of which, thereby accumulating in the circulation, favour the production of effusion in the seat of inflammation. If the disease, of which agalactia is the consequence, is severe, or continue for any considerable time, the function of the mamma is rarely resumed; but if it be slight, or of short duration, the milk returns to the breast with the subsidence of the malady.

8. The *diagnosis* of agalactia should not be overlooked; and the affection, whether primary or symptomatic, should not be confounded with the retention of the milk caused by inflammation of the mamma, and by obstruction of the lactiferous ducts. In these cases, the mamma is hard, painful, and swollen; and the excretion, rather than the secretion, of milk is impeded or interrupted.

9. The circumstance of partial or complete agalactia being sometimes concealed by nurses, particularly by those who are hired to suckle, should be kept in recollection; and, where the infant presents any indication of insufficient nutrition, or is peevish, irritable, and dissatisfied when applied to the breast, the state of the mammæ should be ascertained.

10. The *consecutive states* of agalactia, and the *treatment* of the affection in its several forms, are fully stated in the article Lactation (see § 18. *et seq.*).

ii. Painful Affection of the Mamma. — Syn. *Mastodynia* (from Μαστὸς, mamma, and ὀδυνη, pain). *Der Schmerz in den Brüsten*, Germ. *Mastodynie, Douleur des Mammelles*, Fr.

Classif. — II. Class. I. Order (*Author*).

11. DEFIN. — *Pain, more or less severe, in one or both mammæ, most frequently in one only; generally recurring, and with local heat, or general fever.*

12. Painful affection of the mamma is most frequent during the early months of pregnancy, and in connection with functional disorder or organic disease of the uterus and ovaria. In its slighter forms, it sometimes accompanies the irregular appearances of the catamenia soon after puberty, and suppression of the discharge, either then or at later epochs. Complete or violent neuralgia of the mamma is rare, but less severe pains are not infrequent in nervous and hysterical females, and in those who are the victims of tight lacing, especially when the uterus or ovaria are the seat of irritation, or in the circumstances just alluded to.

13. *a.* When the affection is purely *nervous*, it is *characterised* by the nervous temperament, and hysterical tendency; by the recurring, and even periodic, form; and by the absence of local or general plethora, and of hardness or fulness of the organ. In these cases, the left mamma is more frequently affected than the right. When it depends upon congestion of, and vascular determination to, the mamma, the pain is more continued, although attended by exacerbations; and it is more liable to occur in this form in sanguine and irritable temperaments, in females of a full habit, and in the course of pregnancy and suppression of the catamenia, than in other circumstances. M. CAPURON remarks that this affection may be so severe in irritable females, as to cause agitation, sleeplessness, and delirium. In those of a full habit, the mammæ sometimes become full and somewhat hard, and the pain is more obviously connected with distension of the fibrous envelope of the gland, both mammæ being more frequently affected than one only. Females who have experienced pain in the mammæ before marriage, generally have a return of it afterwards when they become pregnant; and it may continue for a considerable time, or recur at intervals. If it be attended by congestion or vascular determination, these are liable to encrease as the period of parturition approaches; and in plethoric females it may terminate in inflammation and abscess after delivery.

14. *b. Diagnosis.* In all cases of pain in the mamma, the state of the organ should be carefully ascertained, as respects the existence of inflammation or of tumour. The former will be indicated by local heat, fulness, tenderness, and fever; and when these are absent, and no tumour exists, the state and functions of the uterus require attention. This affection of the mamma rarely occurs unconnected with some change in the state of the uterus and its appendages, or with pregnancy; and this latter should be suspected when the pain is associated with suppression of the catamenia. The pain may, however, occur before this discharge has made its appearance, and it may be the first indication of the accession of this change of female life.

15. *c. Treatment.* The *indications* of cure should be entirely based upon the *associations* of the complaint, particularly with the states of the uterus. If this organ is the seat of obvious disorder or actual disease, the treatment should be directed chiefly to the removal of such disorder. The pain in the mamma is here merely a symptom of the uterine disease. If it be consequent upon pregnancy, it is equally a symptom, and one which requires palliatives only,—but these should not be neglected, as a persistence of the affection may excite fever, or other disturbance of a serious nature. In this case, anodyne fomentations, cooling aperients, narcotics given so as to procure repose, gentle frictions of the mamma with soothing or powerfully anodyne liniments, and belladonna and camphor plasters, are the most appropriate means. If the patient be plethoric, and the mamma full and tense, a small or moderate blood-letting, and diaphoretics, as DOVER's powder, the liquor ammoniæ acetatis with spiritus ætheris nitrici, antimonials, &c., are the safest remedies.

16. If the affection present a *nervous character*, the circumstances tending to increase the nervous disposition should be avoided. These, however, the physician often can only suspect; and certan of them he can hardly mention, although there is no doubt of their having induced and prolonged the disorder. Local excitement, mental emotion, a heated imagination, tight lacing, &c., are all often more or less concerned in producing the complaint, whether it appears at the period of puberty or at later epochs; and, when this is the case, the treatment frequently fails, if it be not assisted by an abandonment of the cause. In this state of the disorder, however, the local means above mentioned (§ 15.) should be aided by such as will regulate or promote the catamenia, or subdue uterine irritation, and by those which will restore the impaired tone of the nervous systems and of the organic functions,—especially by camphor, sulphate of quinine, the sulphate of iron, and anodynes. The preparations of iodine, the iodide of potassium with liquor potassæ, the iodide of iron, and the various chalybeate preparations and mineral waters, may be prescribed, particularly when the uterine functions are disordered, or when the blood is deficient in quantity or in Hæmatozine.

II. INFLAMMATIONS OF THE MAMMA. — SYN. *Mastitis* (from μαστός, mamma); *Mastoitis; Inflammation des Mammelles, Mastoite,* Fr. *Entzündung der Brüste,* Germ.

CLASSIF.—III. CLASS. I. ORDER (*Author*).

DEFIN. — *Pain, tenderness, and tension of the mamma, with febrile commotion.*

17. i. INFLAMMATION OF THE NIPPLE. — Various inflammatory affections are confined or extend to the nipple, and occasion, when neglected, unpleasant or painful effects. The chief of these are simple *excoriations, eczematous* and other eruptions, *cracks, fissures,* and *ulcerations.* Sore or inflammatory states of the nipple are very frequent, and are often a source of great distress. They are most common with first children, but some women suffer from them after all their confinements. Inflammatory appearances are seen two or three days after the application of the infant to the breast, and continue with further changes for an uncertain time. — *a.* At first the nipple and areola are dry, rough, red, and harsh, and then excoriated, humid, minutely granulated, often minutely cracked, chapped, or fissured, especially at the base of the nipple, and acutely painful. When the excoriation is considerable, a serous discharge is poured out, and extends the excoriation to the surrounding skin. In more severe cases the nipple exhibits two or three deep fissures, and these may become so extensively

ulcerated as to be partly or even altogether destroyed. In most of these, suckling not only aggravates the symptoms, but also causes the sores to bleed, and occasions extreme torture. When the sores prevent the sufficient application of the child to the breast, the consequent accumulation of milk occasions distension and inflammation of the mamma.

18. *b.* The *causes* of sore nipples are chiefly the too frequent application of the infant to the breast, thereby occasioning the removal of the protecting sebaceous secretion of the part, and favouring inflammatory irritation, vascular injection, and its usual consequences. The constitution, habits, and modes of living of the patient, particularly the use of irritating and exciting articles of diet, and of heating beverages, also favour the occurrence of this affection. The state of the child's mouth, tongue, and gums, more especially aphthæ of these, frequently affects the nipple; whilst, on the other hand, the discharge from the sores of the nipple often inflames the mouth of the infant.

19. *c. Treatment.* In order to *prevent* this affection, Dr. Churchill advises the nipples to be washed with soap and water, and dried, and afterwards bathed with spirit and water, night and morning, during the last month of pregnancy. Sir A. Cooper suggests washing the nipples some time before lying-in with strong brine, in order to harden the cuticle, and render it less prone to crack. Dr. Burns states, that a combination of white wax and butter is often useful; and that stimulating ointments, such as the unguent. hydrarg. nit. diluted with axunge, are sometimes of service; or that the parts may be touched with burnt alum or nitrate of silver, or dusted with some mild dry powder. Some physicians prescribe solutions of alum; some, solutions of sulphate of zinc; and others, the supernatant liquor of a mixture of lime-water and the chloride of mercury. One of the best applications is a solution of a drachm of borax in four ounces of water and half an ounce of spirit of wine, or in equal quantities of water and dilute acetic acid. Pure and fresh *palm oil* is one of the most efficacious applications to the nipple, and the safest to the infant; it need not be washed off previously to applying the child to the bosom, unless it be made the vehicle for other substances. Several writers advise, particularly when chaps, cracks, or fissures exist, a weak solution of the nitrate of silver to be applied after each period of suckling; the nipple being washed before the infant is again held to the breast. Various mechanical means have been employed where fissures, ulcerations, &c. exist. Shields, with prepared cow's teats, are the best of these. Feeding the infant two or three times a day, or a temporary recourse to a nurse, will facilitate the cure; but the milk should not be allowed to accumulate, lest inflammation of the breast itself supervene.

20. ii. Acute Inflammation of the Breast. — *A.* The *symptoms* of this disease are nearly those which characterise acute inflammation of other glandular parts, somewhat modified in their progress and results by the peculiar functions and relations of the organ. Sir A. Cooper describes an adhesive, a suppurative, and an ulcerative stage, the existence of each of which is readily recognised during the progress of the disease. The severity of the symptoms depends upon the principal seat and extent of the inflammation. When the cellular tissue and skin are alone involved, local pain, soreness, with circumscribed hardness and tension, are felt, with slight inflammatory fever. But when the gland itself, its connecting cellular tissue, and the fascia are implicated, the pain is then very severe, and extends to the axilla: the swelling is then more general, and more considerable, the tension greater, and the fever more intense; the skin being hot, the pulse quick and full, with thirst, headache, sleeplessness, &c. If the gland be generally inflamed the breast has an irregular or nodulated feel, as if consisting of several tumours. The secretion of milk is suspended, at least for a time; but it generally takes place after the acute stage has subsided. In this, the *adhesive stage*, lymph is effused into the interstices of the inflamed tissues, and a hard and exquisitely sensitive swelling is produced.

21. After a while an inflammatory blush appears on the surface, the pain becomes throbbing and very intense, rigors or chills, succeeded by heat and perspiration, indicate the formation of pus; a particular portion of the tumour, commonly where the surface was first red, becomes smooth and prominent, and fluctuation is sensible to the touch. Detachment of the cuticle follows, with *ulceration* of the cutaneous textures, and discharge of matter. The whole process usually occupies from ten days to three weeks; but its duration depends upon the intensity of the inflammation, the constitution of the patient, and the depth of the abscess.

22. The *pointing* of abscess of the mamma is generally near the nipple; and when the abscess is superficial, or implicates chiefly the cellular tissue, the matter discharged consists of digested pus, usually contained in only one cyst or cavity; but when it is more extensive, invading the gland and fascia, the matter is sometimes contained in several cavities, and sloughs of cellular tissue occasionally are discharged. In a healthy person, the abscess soon heals up after the matter has been completely discharged; leaving only some hardness for a time.

23. In scrofulous constitutions, however, or in cachectic habits, and in persons whose minds have been harassed, and vital energies depressed, or circulating fluids contaminated, by absorption of morbid secretions from the uterus, or by residence in an ill-ventilated or crowded hospital, a much more severe, rapid, or even a more protracted disease presents itself. Recurring chills or rigors, followed by heat and perspiration; œdema of the surrounding parts, deep-seated fluctuation, or diffused suppuration; low or adynamic fever; and extension of an asthenic form of inflammation to adjoining parts, with the usual ill-consequences, either endanger, or carry off, the patient. In the more protracted cases, suppuration takes place slowly, an abscess forms, bursts, reforms in the vicinity, opens, and extends; and is ultimately followed by sinuses, hectic fever, and its usual attendants.

24. *B. Causes.* According to Sir A. Cooper, the chief cause of this disease is the rush of blood to the breast every time the infant is applied, and which affords the secretion of the organ. It is doubtful, however, whether this is correct; for we do not observe other parts, the functions of which require great or sudden determinations of blood,

more liable to inflammation than organs continuously engaged. But it cannot be disputed, that there are circumstances connected with the functions of the mamma which favour the occurrence of the disease, since we seldom observe it unconnected with lactation; and when it is independent of lactation, it occurs chiefly in consequence of local injury, or morbid states of the uterus.

25. The irritation, congestion, and vascular determination preceding the secretion of milk, is generally attended by fulness and slight tenderness of the breasts, and feverishness. If these local conditions are increased, or exceed moderate limits, the secretion is frequently interrupted, and the breasts become distended, tense, hot, and painful; this state readily passing into inflammation, if it be not soon removed, particularly after delivery of a first child. Dr. BURNS remarks, that some have the breasts prodigiously distended when the milk first comes, and the hardness extends even to the axilla. If, in these cases, the nipple be sunk or flat, or if the milk do not run freely, the fascia, particularly in some habits, rapidly inflames. In others, the dense cellular substance in which the acini and ducts are imbedded, or the acini themselves, become inflamed. This interruption to the flow of milk, and the consequent lacteal and vascular congestion, is one of the chief causes of inflammation. The disease may also extend, as noticed above (§ 17.), from the nipple to more deeply seated tissues. Moving the arms too freely, exposure to cold, mental emotions, and a heating diet, or the abuse of stimulants, especially when the breasts are congested and enlarged, are also frequent concurrent causes of mastitis.

26. *C. Treatment.* — The *first object* should be to procure resolution of the inflammation. This is to be attempted by the application of leeches; by venesection, if the state of the system and of vascular action permit it; by the exhibition of tartar emetic in small and frequent doses; by administering purgatives, especially those of the saline kind; by giving diaphoretics and diuretics; by low diet; by preventing the breast from hanging down, and keeping the arm of the affected side motionless in a sling; and by drawing off the milk very gently by suction at proper intervals. In order to diminish vascular determination to the breast and the secretion of milk, no means are more efficacious than purging by saline medicines, and giving antimonials so as to produce slight and continued nausea. The saline diaphoretics may also be given, with diuretics, especially the solution of the acetate of ammonia with the nitrate of potash, and the sweet spirits of nitre in camphor julap; and, if pain be urgent, opium or other anodynes may be added. As in other instances of topical inflammation, authorities are divided between refrigerating and warm and emollient applications to the part. In some cases, at a very early period, cold applications are useful adjuvants of the above treatment; but emollient poultices and tepid or warm fomentations are most frequently beneficial.

27. When suppuration cannot be prevented, the case is to be treated like any other abscess. With respect to the opening of the abscess as soon as fluctuation is detected, the rule stated by Sir A. COOPER should be followed. — "The surgeon should never wait for an abscess of the breast to approach the surface, but make an opening as soon as the slightest degree of fluctuation is perceptible." The rigid observance of this rule will generally prevent the formation of sinuses; the treatment of which does not come within the scope of this work.

28. In all the stages of this disease, some one or other of the preparations of opium should be given to allay irritation or intense pain. In the states of the malady characterised by general irritation and vital depression — by irritative or adynamic fever, as noticed above (§ 23.), opium in large doses with camphor, stimulants, aromatics, and alkaline carbonates, and the general treatment advised for *asthenic inflammation* and *diffusive abscess* (see Art. ABSCESS, § 62.; and INFLAMMATION, § 239. *et seq.*), are particularly indicated.

29. After an abscess of the breast has been opened, the diet may be improved; and if the discharge be profuse, and the pulse be deficient in power, tonics should be prescribed. If the abscess be small and superficial, the infant may suck the affected breast; but if it be large, it should be artificially drawn, and the infant confined to the other breast. However, the effect of sucking the sound breast should be closely watched, as inflammation of it also may be thereby induced, whilst the disease of the one first affected may be aggravated. In either case, the infant should be removed altogether. In cases of spreading abscess or sinuses, bark, wine, and generous diet, with pure air, or change of air, are always necessary.

30. iii. CHRONIC INFLAMMATION OF THE BREAST. — *a.* In the acute form of mastoitis, the disease seldom continues longer than five weeks; and when resolution does not take place, it generally arrives at the stage of suppuration in a few days. But a slighter state of inflammation of the organ may exist, and, from the state of the local and general symptoms, be confounded with another disease. In this case, the little pain which is felt, the absence of heat, of redness of the skin, and of febrile symptoms, and the want of rigors or chills, often prevent the suspicion of the formation of matter, which is generally indistinct and deep-seated; and suggest the existence of a malignant tumour, requiring an operation for its removal; which has even been actually performed or attempted.

31. *b.* The *Treatment* of these cases should consist of means to promote the secretions and excretions, and to improve the state of constitutional power, which is generally more or less in fault. The pilula hydrarg. chloridi comp. with soap at night, and tonic decoctions or infusions, with alkalies, &c., during the day, are usually indicated. If matter have not yet formed, Sir A. COOPER recommends the application of discutient plasters and stimulating embrocations, in order to promote the absorption of infiltrated fluid. But when matter is formed, the abscess should be opened and poulticed; tonic medicines should be exhibited, and a generous diet allowed. The glands in the axillæ sometimes become enlarged from irritation, but subside when the disease in the breast is removed.

32. iv. CHRONIC INFLAMMATION OF THE LACTIFEROUS TUBES. — *Lacteal or lactiferous swelling*, A. COOPER. — This disease sometimes follows

inflammation of the nipple, and consists of inflammation, generally chronic, of one of the lactiferous tubes near the nipple, by which its canal is narrowed, or entirely obstructed, to the extent of half an inch or more, whilst the portion which is not thus affected becomes painfully distended with milk.

33. *a.* The *symptoms* are as follows:—The tumour is confined to one part of the breast, from the nipple to the circumference; and it has not been preceded by redness, or any other symptom of inflammation of the part which is distended so as to form the tumour. The patient complains of a severe sense of distension, which is increased when the child begins to suck. There is distinct fluctuation in the tumour, while no other symptom of abscess is present: the cutaneous veins are enlarged, but the part is not discoloured. If the swelling be opened, several ounces of milk are discharged, which, being suffered to rest for a few hours, forms a cream upon its surface. If a small puncture only be made, the milk discharged, and the orifice allowed to close, the fluid re-accumulates, and the symptoms are renewed. When the distension is excessive, ulceration sometimes takes place; the milk is discharged through a small aperture near the nipple, and this discharge often continues during the whole period of lactation.

34. *b.* The *Treatment* should consist in removing the child, which will soon occasion a cessation of the secretion of milk, and then a simple puncture may be made, which will relieve the distended tube. If, however, the child be suffered to continue at the breast, the opening should be made larger, so that the milk may escape while the child is sucking, as happens when a natural relief is effected by ulceration.

III. Organic Lesions of the Mamma generally occurring independently of Inflammation.

Classif.—IV. Class. I. Order (*Author*).

35. This class of diseases of the breast seldom originates in any form of inflammatory action — or at least in an unequivocal and manifest state of inflammation; but rather in conditions of the part and of the system very different from it — especially from true or sthenic acute inflammation. This class is mostly referable to low states of vital power and vascular action, in connection with altered or morbid nutrition and secretion in the organ — to local irritation and lesion allied with constitutional vice or disorder.

36. i. Hæmorrhagic Congestion of the Mamma — *Ecchymosis of the breast,* A. Cooper. — This change is generally associated with a considerable degree of *mastodymia.* It consists *of a full and bruised appearance of the organs, accompanied with pain and exquisite sensibility or tenderness.* — *a.* It occurs chiefly in females under twenty-five years of age, and is preceded by severe pain in the breast and arm. The extravasation of blood, occasioning the ecchymosis, begins a few days before menstruation, and either is limited to a single spot, appearing as if a severe blow had been inflicted, or consists of several small spots: generally one large patch and several small and paler patches are observed. It occurs chiefly in females of delicate fibre, who have large bosoms. The part is exquisitely tender, and the pain passes down along the inner side of the arm to the ends of the fingers. This affection sometimes disappears a week after menstruation; but, in the more severe cases, it continues until the next menstrual period. It is evidently a consequence of increased determination of blood to the organ prior to the catamenial discharge, and indicates great irritability of the system, in connection with weakness of the capillaries, whereby they are incapable of resisting the determination of blood to them. It is generally attended by irregularity of the catamenia, and constitutional debility and irritability.

37. *b.* The *Treatment* should be directed to the uterine and constitutional relations of this affection. The preparations of iron, the mineral acids, sulphate of quinine, or sulphate of iron, in the compound infusion of roses, or other appropriate tonics, may be prescribed; and the liquor ammoniæ acetatis with spirits of wine, tincture of opium and rose water, may be applied locally.

38 ii. Atrophy of the Mamma. — *Absorption of the mammary gland,* or rather wasting of this part, usually occurs at an advanced age, or subsequently to the disappearance of the catamenia; and it has been said to be produced by the excessive use of the preparations of iodine. But probably, in some of the cases where this effect has been said to have been produced, the adipose substance in which the gland is imbedded is the part chiefly absorbed. Atrophy of this organ does not appear to follow the tumefaction of it sometimes consequent upon cynanche parotidea. (Cumin, *Edin. Med. and Surg. Journ.* vol. xxvii. p. 227.)

39. iii. Hypertrophy of the Mamma. — Enlargement of the organ is sometimes observed to a very great extent. In most of the slighter cases, however, particularly when both mammæ are enlarged, the hypertrophy is chiefly owing to the great increase of adipose substance around the gland. — *a.* True hypertrophy of this organ is independent of any morbid change of structure, and of any distinct tumour. It is entirely an unusual, and sometimes an almost monstrous, growth of the gland. The increase of size is generally uniform, and it is at the same time more or less pendulous. At the commencement, indications of increased determination of blood to it are sometimes evinced, as heat, uneasiness, augmented sensibility, &c. True hypertrophy of the mamma is called by Sir A. Cooper, "*the large and pendulous breast.*" It consists in an increase of the substance of the mammary gland, the lobes of which can be distinctly felt enlarged and hardened; and they are sometimes tender on pressure. This disease generally commences soon after puberty, and is believed to be always connected with defective or disordered menstruation. The breast, in many cases, has attained so enormous a magnitude as to render extirpation absolutely necessary. In a case mentioned by Mr. Hey, after the removal of the left breast, the menses, which had been entirely suppressed, returned, and the right breast diminished to less than half the size it was before the operation. The amputated breast weighed eleven pounds four ounces.

40. Sir A. Cooper describes a peculiar form of hypertrophy of the mamma incident to unmarried women of the age of thirty or thirty-five, in whom the menses are defective in quantity, and who are the subjects of severe leucorrhœa. The breasts become enlarged, but not pendulous. On careful examination the lobes of the gland can be distinctly

felt enlarged and hardened, and moving freely on one another. Both breasts are affected, but one usually more than the other, and there is occasional pain, especially just before the appearance of the menses, which are scanty, pale, and of short duration. Exposure of the part to cold augments the pain, and, in these cases, cold has a great influence in lessening the menstrual secretion. An enlarged absorbent gland is sometimes found in each axilla; but this arises from simple irritation. After a while the breasts begin to waste, and in a few years are nearly absorbed.

41. *b.* The *Treatment* of this affection is that of amenorrhœa, of which it is generally a consequence. In the first variety of it, local means are not likely to be of any service. In the second variety Sir A. COOPER recommends the application of the emplastrum ammoniaci cum hydrargyro, and of leeches when there is pain. In both varieties, the preparations of iodine are the most appropriate remedies, and when judiciously prescribed, and combined with deobstruents and emmenagogues, are often of service. The iodide of potassium alone, or with liquor potassæ and conium; the iodide of iron, and the iodides of mercury, should be preferred, as they exert an emmenagogue operation, whilst they diminish the size of the mamma.

42. iv. SCROFULOUS TUMOURS OF THE BREAST. — *a.* In women of a strumous diathesis the mamma is subject to various indolent tumours, which in their earlier stages are not easily distinguished from diseases of a much more serious nature. Sometimes a hard lump forms in the organ and remains almost quiescent for months or even years; or the whole gland may be affected with scrofulous enlargement. The general tendency of the disease, however, is to the slow and imperfect suppuration characteristic of strumous action; and the matter has the curdy appearance which the contents of scrofulous abscesses always present. Ulcerations of great depth and extent sometimes result; but the topical disease usually produces no proportionate effects on the constitution. In this disease, the part is always enlarged, not contracted as in one form of carcinoma. The tumour is tender when grasped, but it does not present the stony hardness observed in the latter malady. According to Dr. CUMIN it is never attended by retraction of the nipple. The indications of the strumous diathesis of the patient, together with the characteristics of scrofulous ulceration in the part, will further determine the nature of the disease.

43. *b.* The *Treatment* of scrofulous tumours of the breast is the same as that just recommended (§ 41.), namely, the exhibition of the preparations of iodine; of BRANDISH's alkaline solution, conium, &c.; or the means advised in the article SCROFULA. Strict attention should be directed to the uterine functions; the catamenia ought to be promoted, and the general health improved.

44. v. ADIPOSE TUMOURS are but rarely found in the breasts; but they reach a very considerable magnitude. In the cases described by Sir A. COOPER, the tumours formed, in one case, between the gland and the surface of the pectoral muscle; and in another, between the different portions of the mammary gland.

45. In the *treatment* of these tumours, the internal use of the iodide of potassium, with or without the liquor potassæ, should not be overlooked, as I have found these remedies succeed in removing adipose tumours in other situations.

46. vi. CHRONIC MAMMARY TUMOUR. — *a.* This disease generally attacks females between the ages of seventeen and thirty-five. It is often independent of very manifest constitutional disorder, and it does not necessarily affect the general health, unless by occasioning anxiety in the mind of the patient as to its nature. But it is usually connected with uterine irritation or disorder. It occurs chiefly in single women, or in those who have not had children. The tumour grows from the periphery of the breast rather than from its interior; and it therefore generally appears to be superficial: occasionally, however, it springs from the posterior surface, and it is then deep-seated, and not so readily discriminated. It is extremely moveable, and glides easily over the surface of the breast, to which it is attached chiefly by an aponeurosis. It begins and often continues for many years without exciting pain; in some cases, however, it is attended with an aching pain, which extends to the shoulder. It is not generally tender to the touch, but Sir A. COOPER has occasionally found it so just before the menstrual periods. Its growth is very slow, and it seldom attains any great magnitude, usually weighing from one to four ounces. One, however, which was removed by Mr. BOND, of Brighton, weighed a pound and a half, and Sir A. COOPER mentions a case which occurred in Guy s Hospital, and which he believes to have been of this nature, where the tumour weighed several pounds, and had ulcerated at its most prominent part. These tumours are originally quite free from malignancy; they exist for many years almost in a stationary condition, and then gradually diminish and disappear.

47. *b.* The most distinctive *anatomical feature* of this tumour is its lobulated structure, which may be felt by careful manipulation before its removal. *On dissection* the tumour is found to be contained in a bag formed of a fibrous structure, similar to that which envelopes and enters the interstices of the mammary gland: and this envelope becomes denser in proportion to the magnitude of the tumour. When first laid bare, the tumour appears to be composed of large lobes, like those of the breast; but, when more completely unravelled, it is found to consist of smaller and smaller lobes, similar in form and easily separable by maceration in water. Sir A. COOPER observes, "The impression made upon the mind during the dissection of the tumour is, that Nature has formed an additional portion of breast composed of similar lobes, but perhaps differing in the absence of lactiferous tubes. When first opened, they appear red in the circumference, but whiter in the interior."

48. *c.* The *diagnostic marks* of this disease are, the youth of the patient, scirrhus rarely appearing before thirty, this disease seldom after it; — absence of pain, or of pain similar to that of cancer, the pain sometimes felt being slight, and considerable swelling existing for years without it; — the general health being either not at all or slightly affected*; — the slow progress of the swelling,

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* When the patient perceives the physician to be suspicious of its malignant nature, her anxiety may so disorder the general health as to increase the difficulty of the diagnosis. Such was the case in respect of a lady sent to me a few years ago from the country by her

and its stationary condition for many months or even years; — its extreme mobility, its superficial position, or its situation upon or in connection with the gland rather than in it; — and lastly, its lobulated feel, it being distinctly composed of numerous lobes conglomerated into one mass, with a divided surface. The glands of the axilla very rarely enlarge, the enlargement being the result of irritation only.

49. I believe that Sir ASTLEY COOPER is correct in his observation, that, although these tumours are not in their commencement malignant, and they continue for many years free from the disposition to become so, yet if they remain until the period of the cessation of menstruation, they may assume a new or malignant action. I believe, moreover, that protracted anxiety and the depressing emotions generally, may produce the same effect, even before this period occurs.

50. *d.* The *cause* of this disease is chiefly vascular determination consequent upon irritation seated principally in the uterine organs and extending to the mamma. Hence it is often associated with signs of uterine excitement or irritation, or with disorder of the catamenia. It is sometimes ascribed to a blow, or to the pressure of stays; but these are rather concurring or additional, than the only causes.

51. *e.* The *Treatment* should be directed chiefly to the state of the uterine organs; for the disease is seldom much influenced by means directly applied to it. The disappearance of the tumour is generally owing to the cessation of the uterine irritation in which it originated, or to the mamma being called upon to exercise its natural function in the secretion of milk. The catamenial discharge ought to receive attention, as regards its time, its quantity, its colour, and its duration. When it is scanty, difficult, attended by pain, pale, or delayed, I have found an occasional purgative of calomel and compound extract of colocynth, and the preparations of iron or of iodine, more particularly the iodide of iron, the iodides of mercury with conium, or the iodide of potassium with liquor potassæ and tonic infusions, extremely beneficial. The mist. ferri composita with conium, and attention to the biliary and digestive functions, are also very serviceable. Where these functions are torpid, the pilula hydrarg. chloridi composita with soap and conium at bed-time; and the infusum calumbæ, vel infus. cascarillæ, cum infuso rhæi et sodæ sub-carbon, &c., twice a day, will generally be of service. The emplastum ammoniaci cum hydrargyro, and a weak iodine ointment, are the best *local applications*; but these should not supersede the internal use of some one of the preparations of iodine, in small doses, and for a sufficiently long period. Pregnancy and lactation are, however, the most certain means of removing this disease. A young lady resident in a country town had this disease, and two or three surgeons were consulted respecting it. She was engaged to be married, and her intended husband was made acquainted with her complaint. Owing to the opinion then given the marriage was delayed for more than two years, during which time the disorder was stationary. Another surgeon was consulted, who recognised the true nature of the disease, and sent her to London for my opinion. I advised her no longer to delay her marriage. Sir A. COOPER was afterwards consulted, and concurred in this opinion. The disease afterwards gradually disappeared.

52. vii. PAINFUL TUMOUR OF THE MAMMA — *Irritable tumour of the breast*, A. COOPER.—A. The female breast, as already stated, is liable to severe hysterical or neuralgic pain, quite unattended by swelling or distinct tumour. But similar pains to those above noticed (§ 11.) are sometimes associated with slight tumefaction of one or more of the lobes of the organ; and more rarely they are attendant upon a specific tumour, described by Sir A. COOPER. In the neuralgic affection, without any circumscribed tumour, the swelling appears to be merely an incidental complication, as in neuralgia of the face and other parts. The pain, though greatest at some particular part, generally pervades the whole breast, and extends to the shoulder, axilla, arm, and fingers of the affected side, sometimes also extending downwards even to the hip. The slightest pressure on the breast occasions intolerable pain, and alternate sensations of heat and cold are felt in the affected part. The intensity of the pain often occasions sickness and vomiting. The symptoms are much augmented just before menstruation, somewhat relieved during its continuance, and diminished after its cessation.

53. Besides this irritable state of the whole or part of the breast, a distinctly circumscribed tumour is sometimes found, often not larger than a pea, and seldom exceeding the size of a marble. It is highly sensitive to the touch; very moveable; and acutely painful at intervals, especially prior to menstruation. Occasionally several such tumours co-exist, but there is usually only one. These tumours continue for years. Sir A. COOPER has never known them to suppurate. They sometimes spontaneously cease to be painful, or disappear altogether.

54. B. *On Dissection*, they are found to consist of a solid, semi-transparent substance, with fibres irregularly interwoven. They seem to be productions of the cellular membrane rather than of the glandular substance of the part; and similar tumours are met with in the cellular membrane of other parts of the body which are attended with the like painful sensations. Sir A. Cooper has not been able to trace any large filament of a nerve into them.

55. These painful or neuralgic tumours of the breast are met with generally between the ages of sixteen and thirty; and, from this as well as from other circumstances, cannot be confounded with other diseases. They affect principally females of a nervous temperament; are commonly connected with deficient, difficult, or suppressed menstruation. In some cases, however, Sir A. COOPER has observed them associated with morbidly abundant menstruation. In a case of this affection, for which I was lately consulted, and which has been removed by treatment directed chiefly to the uterine organs, a severe return of it occurred during the second month after marriage, evidently in connection with early pregnancy. I have observed these affections complicated with leucorrhœa as well as with catamenial disorder.

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medical attendants for my opinion. I readily recognised the non-malignant nature of the malady, and in this opinion both Sir A. COOPER and Sir B. BRODIE, who subsequently met me in consultation on it, entirely concurred.

56. c. The *Treatment* of this affection should be directed, 1st. to the alleviation of the local suffering; 2d. to the subduing the general irritability; and 3d. to the restoration of the uterine organs to a healthy condition.

57. *a.* Sir A. Cooper states that the best *local remedies* are, a plaster consisting of equal parts of soap cerate and extract of belladonna; poultices of bread with solution of belladonna; and oil-silk, or hare-skin or some other fur worn upon the breast. Leeches may be used when the pain is very severe; but, if prescribed for weak or reduced constitutions, or when the disease is connected with anæmia, or too frequently resorted to, they aggravate the irritability of the system.

58. *b.* To remove the general irritability, the treatment advised for Neuralgic Affections are the most efficacious, with proper attention to the uterine functions. If the biliary organs be sluggish, the chloride of mercury, or Plummer's or blue pill, with soap, opium, and conium, should be given at night; and a stomachic or an emmenagogue aperient in the morning; the preparations of iron, or of bark with soda or potash, or camphor being taken during the day. Sir A. Cooper advises the following pill to be taken twice or three times in the day.

No. 290. ℞ Extracti Conii; Ext. Papaveris, āā, gr. ij; Extr. Stramonii è Seminibus, gr. ¼ vel ss. M. Fiat Pilula, bis terve in die sumenda.

59. *c.* In order to remove the uterine disorder, the carbonate of iron, the ammoniated iron, the compound myrrh mixture, the compound aloes mixture, and similar means, combined with such others as the peculiarities of the uterine disorder will suggest, ought to be prescribed. These means may be promoted by a recourse to a hip-bath of sea water or of artificial salt water, of a temperature of about 100°, or 103°. A salt-water shower-bath, or the salt-water douche, on the loins and hips, will also be of service when aided by regular exercise in a dry, temperate, and pure air; by attention to diet, regimen; and by due regulation of the mental emotions and desires.

60. viii. Cartilaginous and Ossific Tumour. — According to Sir A. Cooper, these tumours are consequences of chronic and specific inflammation of the breast, during which a gelatine is effused resembling that in which bone is formed in the fœtus. But the formation of bone in the fœtus is not an inflammatory process. He supposes that bloodvessels and absorbents enter the effused gelatine from the adjoining parts; and as the latter remove portions of it, the former deposit the ossific matter in the interstices. Bayle describes ossification as the last stage of what he denominates fibrous tumour of the breast. Sir A. Cooper removed a tumour of the kind under consideration from a woman thirty-two years of age. It was of fourteen years' standing, excessively hard, and very painful. The pain was increased before menstruation, and greatly relieved after it. The skin covering it felt very warm in comparison with the surrounding parts, and required the constant application of evaporating lotions. On dissection, the greater part of it presented the appearance of the cartilage which supplies the place of bone in the young subject; the rest was osseous. The most remarkable case on record is that of a nun, in whom the mammæ were found after death transformed into hemispheres of bone. (*Miscel. Nat. Curios. Dec.* ii. An. vi.)

61. ix. Cystic and Hydatidic Tumours of the Mamma. — Tumours of this description have been described by Sir A. Cooper, M. Velpeau, Dr. Warren, and Dr. Cumin. The first of these writers has described *four* varieties of hydatid diseases of the organ, three of which he considers not to be malignant; the fourth to be malignant. A more correct division would be into those consisting — 1st, of serous cysts; and, 2d, true hydatids; and it is not improbable that the former may assume various forms, or be variously transformed, as respects the characters and number of the cysts, the appearances of their coats, and the nature of their contents, in the progress of their growth, and by peculiarities and changes in the patient's constitution and health. Indeed, any one of them may possibly assume the cancerous or malignant character, owing to these circumstances.

62. *A.* The *cystic tumours* vary remarkably, not only as respects the number and size of the cysts forming the tumour, but as respects the number and appearances of their tunics, and the nature of their contents. Some of these tumours present one large cyst, with various partitions; others consist of several cysts, more or less distinct; others, again, are formed of several concentric tunics: some contain a sero-mucous fluid; others a sero-sanguineous liquid.

63. Sir A. Cooper describes, as follows, his first species, or tumours consisting of *simple serous cysts*, or bags; he, however, confounds *simple cysts* with hydatids (see art. Hydatids). — In this form of disease, the breast gradually swells; and is, at first, free from pain and tenderness. It becomes hard, without fluctuation; and grows slowly for months, or even years, sometimes acquiring a very considerable size. At an early stage the swelling feels entirely solid, and greatly resembles a simple chronic enlargement of the breast; but, after a great length of time, fluctuation may be detected at one part of it. The tumour then begins to increase more rapidly, and fluctuation may soon be detected in several parts. There is still, in most cases, little or no pain; some patients, however, feel an unusual heat in the part, and others experience pain in the breast and shoulder. The tumour is extremely moveable on the pectoral muscle, and is very pendulous. In some cases, the whole of the mammary gland becomes involved; in others, only a small portion of it. Such tumours often attain a very considerable size: Sir A. Cooper states that the largest he ever saw weighed nine pounds; but that, in other cases, although the diseased breast was entirely filled with cysts, it never exceeded twice the size of the healthy one. At length, one of the fluctuating portions slowly inflames, ulcerates, and discharges a large quantity of a fluid resembling serum, but somewhat more glairy. If the sac be entirely emptied, and the external opening closed, it is a long time before the fluid reaccumulates, and, occasionally, the sac is obliterated by the adhesion of its sides. Sometimes several cysts burst in succession, at distant periods, forming sinuses which are very difficult to heal. Except during the process of ulceration, the general health is not at all disturbed. Even when the tumour is large, ulcerated, and dis-

charging profusely, the axillary glands remain unaffected; or, if one be slightly enlarged, it is from simple irritation, and the enlargement subsides when the disease in the breast is removed.

64. The *second species* of cystic tumour described by Sir A. Cooper seems hardly entitled to rank as such, since it is formed on a single case, and a doubt is expressed whether even this might not have been of the nature of the globular or true hydatid. It is represented as undistinguishable from the preceding species except by dissection. In the case examined by Sir A. Cooper the tumour consisted of vast numbers of cystic formations, the largest of which did not exceed the size of a barleycorn. They were oval, and composed of numerous lamella, which could be peeled from each other, and which were very vascular.

65. *B.* The *true globular hydatidic tumour*, the third species of hydatid tumour of Sir A. Cooper, is similar to hydatid productions in other parts of the body. Sir A. has found the globular hydatid only to exist singly in the breast, although great numbers are found congregated in other parts. When one of these hydatids is developed in the breast, inflammation is excited, and a wall of fibrine surrounds it. The tumour feels hard, and while it is small no fluctuation is perceptible; but as it increases, and the fluid becomes more abundant, a fluctuation may be felt in the centre of the tumour. Sometimes, when the hydatid has attained a considerable size, it occasions suppuration; and the cyst being discharged along with the matter, a spontaneous cure is effected.

66. *C. Diagnosis.* — Cystic and hydatidic tumours of the breast, in their first stage, may be confounded with chronic inflammation, but are distinguishable from it by the absence of tenderness on pressure, and still more decidedly by the unimpaired health of the patient. In the second stage, when fluctuation is perceptible, they may be distinguished from abscess by observing that the fluctuation exists at more points than one; and the puncture of a cyst will at once remove all ambiguity. These tumours of the breast are distinguished from scirrhus by the absence of lancinating pain and stony hardness which characterise the latter, by their mobility on the pectoral muscle, by their pendulous state, and by the unimpaired general health of the patient. Sir A. Cooper, however, has seen a case in which true scirrhus was combined with hydatids; and Mr. S. Cooper has met with a similar instance. The former of these writers has never seen those tumours seated in both breasts at the same time. They are met with at all ages after puberty; but seem more frequent under than above the age of thirty or thirty-five. Of the cases adduced by Sir A. Cooper, sixty years was the greatest age.

67. Although neither *serous cysts*, nor true globular *hydatids* of the breast, are of themselves dangerous, yet I agree with Dr. Cumin in suspecting that they occasionally give rise to, or rather are transformed into, other morbid changes of a very serious nature. The contents of the cysts are at first a straw-coloured serum; but in time this may acquire a greenish colour, and even a fœtid odour. Indeed, I believe, that not only these tumours, but also the other chronic tumours noticed above, the cystic and hydatidic more especially, may assume, particularly in persons above thirty years of age, a scirrhous or malignant character; when anxiety of mind, the depressing emotions, and other causes of physical depression and exhaustion, have permanently lowered the vital energies, and weakened vital resistance to the local mischief.

68. The *Morbid Anatomy* of cystic and hydatidic tumours is so similar in all parts of the body, that we need not here dwell on their particular characteristics as occurring in the breast. The reader will find them minutely detailed, as respects this organ, in Sir A. Cooper's work, and in the article by M. Velpeau, referred to in the Bibliography.

69. *D.* Neither local applications nor internal medicines are of any service in this disease, the *treatment* of which is purely surgical. If there be only one large cyst, the fluid may be evacuated by a simple puncture, and in some cases, it will not again accumulate; but where the enlargement of the breast is excessive, and the cysts numerous, and especially where the patient is under great apprehension of some malignant disease, the tumour should be removed, taking care to extirpate every part of the morbid formation, since, if a single cyst be allowed to remain, the disease will be renewed.

70. *E.* The *third* or *malignant class* of diseases of the breast comprise chiefly *cancer* and *fungus hæmatodes*, or encephaloid disease. But, after what I have stated in other parts of the work, it is unnecessary to advance any thing at this place respecting these maladies when affecting the mamma. The reader will find all that is requisite to be considered respecting them in the articles Cancer and Fungoid Disease.

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MANIA. — See Insanity.

MEASLES. — Synon. — *Morbilli* (a lesser plague in the Italian), Morton, Sydenham, Juncker. *Febris Morbillosa*, Hoffmann. *Rubeola*, Sauvages, Cullen, Willan, &c. *Roseola*, Auct. var. *Phœnicismus*, Ploucquet. *Synocha Morbillosa*, Chrichton. *Cauma Rubeola*, Young. *Exanthesis Rubeola*, Good. *Masern*, *Rötheln*, *Flecken*, *Kindsflecken*, Germ. *Rougeole*, Fr. *Rosolia*, *Rossole*, *Morbilli*, Ital.

Classif. — 1. Class. III. Order (*Cullen*). III. Class, III. Order (*Good.*). — III. Class. III. Order (*Author*, in *Preface*).

1. Defin. — *After catarrhal symptoms, the eruption, generally on the fourth day, of a crimson rash, consisting of stigmatised dots, slightly elevated, and disposed in irregular circles or crescents, usually desquamating on the seventh day, and accompanied with inflammatory fever, — the disease being an infectious exanthematic fever, frequently occurring epidemically, and affecting the system only once.*

2. This disease attacks chiefly children, but no age is exempt from it, and it appears in all climates. It generally commences from seven to fourteen days after the reception of the contagion, with horripilations followed by catarrhal fever, on the third, fourth, fifth, or even sixth day of which, but usually on the *fourth*, a crimson rash appears, and after a continuance of four days, gradually declines with the fever. It may attack the fœtus in utero, when the mother is affected by it. It is usually most severe in young children, especially during teething and soon after weaning, at the time of the second dentition, and at the approaching period of puberty. It is comparatively slight in adults; but to this there are many exceptions, the severity of the disease, even in them, depending much upon the prevailing epidemic, and upon the climate in which the epidemic occurs.

3. I. History. — Several writers, and amongst others Sennert, Welsch, Manard, Odier, and Bateman, suppose that measles were known to the ancients. Odier has even contended that the plague of Athens described by Thucydides was an epidemic visitation of this disease. Gruner (*Antiquit. Morbor.* p. 54.) and Sprengel, however, as well as many other judicious authors, have shown that the earliest accounts we have of this disease, refer it to about the period at which small-pox was conveyed from Arabia to Egypt, and thence into Europe.

4. The earliest account which has been furnished of measles, is contained in the Pandects of Rhazes, who describes it under the name of *Hhasbah*, not, however, from his own observations only, but also from the information conveyed by Ahron, who lived in 622 at Alexandria. Ueberlacher (*Ueber die Grundlosigheit der ersten Schilderung*, &c. Wien, 1805), entertains, however, an opposite opinion, as to the description of Rhazes being applicable to measles, but, in my opinion, without sufficient grounds. Avicenna and Mesue have also described measles (*Hhasbah*), and distinguished it from small-pox (*Dschadari*), and the morbillous form of scarlatina (*Hhamikah*).

5. It has been supposed by Schnurrer (*Chronik der Seuchen*, s. 117.), that the epidemic which prevailed a. d. 455 through Phrygia, Cappadocia, and Cilicia, and is described by Eusebius as being accompanied with inflammation of the whole skin, turgidity of the eyes, and violent cough, was measles in a severe form; but the imperfect description given of that epidemic leaves room only for supposition.

6. The invasion of Spain by the Saracens in the eighth century most likely extended this disease to Europe at the same time with small-pox. Mention is made in the chronicles of the time that an epidemic prevailed in Italy in 876, which was characterised by pain and turgidity of the eyes, severe cough, &c., and which, as Schnurrer supposes, may possibly have been this disease. About the middle of the twelfth century Synesius (*De Febribus*, edit. Barnardi, Anat. 1749) translated into Greek the work of an Arabian physician, Abn Dschafar, where small-pox (*φλυκταινούση λοιμικὴ*) is distinguished from measles (*ἑτέρα λεπτῆ καὶ ποκνῆ λουμικὴ*).

7. However, measles was very generally confounded with small-pox even as late as 1674. Amongst the last writers who committed this error were Lange and Diemerbroeck, whilst the distinction was first clearly made by Forestus (1597), Schenck (1600), Riverius (1655), and particularly by Sydenham (1676), and F. Hoffmann (1718), who, with Huxham and Lepecque de la Cloture, have recorded the history of several epidemics, and added greatly to our knowledge of the disease. At the same time it may be noticed that Morton and Watson confounded *measles* with *scarlet fever*, and viewed the latter as a severer variety of the former disease; and, as Dr. G. Burrows has remarked, it was not until the appearance of Dr. Withering's *Essay on Scarlet Fever*, in 1793, and of Dr. Willan's *Treatise on Cutaneous Diseases*, that the profession was fully convinced of the distinct nature of the two diseases.

8. II. Description of Measles. — Instead of dividing this disease into different *varieties* or *forms* — as the *Rubeola vulgaris*, the *Rubeola maligna*, and the *Rubeola sine catarrho*, &c., I shall *first* describe *the regular form of the disease*, and *next* notice *those modifications, complications, and irregularities* which it presents, according to the influence of individual constitution, epidemic prevalence, and of climate.

9. i. The Regular Form of Measles. — *Rubeola vulgaris*, Willan, Bateman, &c.; *Morbilli regularis*, Sydenham; *Rougeole vulgaire*, Fr. The *progress of the disease, in its regular and common form*, is similar to that of all the eruptive fevers, and consists of *four* well-marked *stages*, namely — 1st. The period of *febrile commotion*; — 2. That of *eruption*; — 3d. The stage of *florescence*; — and, 4th. That of *desquamation*.

10. 1st. The *period of febrile commotion*, or of *precursory fever*, is that in which the infection of the whole frame has commenced, and that febrile action appears, which produces, after a certain period, the cutaneous eruption. This stage usually commences with chills, horripilations, shudderings, or rigors, alternating with heat of skin, and accompanied by a turgidity, erethism, or catarrhal irritation of the mucous membranes, particularly those of the respiratory apparatus. The patient is affected with frequent sneezing, coryza, stuffing of the nose, sometimes with dryness and redness of the pituitary membrane, — with heat, redness, turgidity, and watering of the eyes; sensibility to light, heaviness or pain in the head, somnolency in very young children, and in older subjects, wakefulness; frightful dreams; pain or aching in the back and loins; soreness, pain, and tenderness at the epigastrium, and with slight hoarseness and dry cough. Sometimes the eyelids and sub-maxillary glands are slightly swollen. The appetite is diminished or abolished, whilst the desire for cold drinks is much increased. The tongue is white and loaded, and an unpleasant taste in the mouth is often complained of. There are frequently nausea, vomiting, and a lax or irregular state of the bowels. The febrile commotion rarely amounts to the production of con-

vulsions or delirium: but generally, more or less exasperation of fever, preceded by chills and horripilations, and accompanied with a full hard pulse, oppression at the chest, and difficulty of breathing, occurs towards evening, and remits towards morning, when a slight moisture appears in the skin, until the eruption appears. Instances, however, are not uncommon of so slight a grade of the disease, as not to render it necessary for the patient to keep his bed: and yet in some of those cases the patient may have complained for several days of catarrhal fever. In the more severe cases, hæmorrhage sometimes takes place from the nostrils, or a hæmorrhagic discharge occurs from the uterus, in this stage with considerable relief.

11. 2d. *Stage of eruption.* During the third febrile exacerbation, generally about the fourth day from the first occurrence of horripilations, an eruption takes place first on the face, particularly the cheeks, around the eyelids, nose, and ears; and next on the neck, breast, arms, hands, and abdomen, and last on the lower extremities, with more or less turgidity of the countenance, particularly of the eyelids. Sometimes great restlessness, anxiety, convulsive movements, inequality of pulse, pain and sense of fulness in the head, slight delirium, or epistaxis usher in the eruption, which is generally completed in twenty-four hours. At this period, the tongue is red at its point and edges, loaded or furred at its base, and the fauces exhibit some obscure patches resembling the cutaneous eruption. The eruption is at first discrete and scanty, resembling the bites of fleas. The stigmata increase, are of a crimson or reddish colour, slightly elevated above the skin, and rough to the touch, particularly on the face and early in the eruption. When examined with a glass, they have a rounded or rather an elliptic form, resembling linseed. When the papulæ are fully formed they are of a lively red, but contain no fluid; when pressed by the finger they momentarily lose their colour, which returns rapidly upon removing the pressure; and their circumference is not defined, their colour being deepest in the centre and becoming paler until they insensibly pass into the natural tint of the skin. WEDEKIND (*Ueber die Masern.* RÖSCHLAMB's *Magazin*, iv. B. No. 6.) observed an extremely fine hair, scarcely discernible by the unassisted eye, penetrating each of the morbillous papulæ. If the eruption is very scanty, it is never equally diffused over the surface, but appears in clusters in different parts, separated from each other by large patches of healthy skin. Although the papulæ or stigmata may approximate nearly to each other, and coalesce into patches, they never completely run into each other, particularly in the early period of the eruption. In the more severe cases, however, especially in adult subjects, they often coalesce much more closely, the cutaneous surface assuming a deep red. The more acute the fever, the more copious is the eruption, which scarcely ever diminishes the fever, but, on the contrary, is often increased by it, until the period of desquamation. During the eruptive stage the transpiration and breath have a peculiar odour, which generally continues till the seventh day, and is at first of a slightly sweetish, and afterwards of an acidulous character, and has been likened by HEIM to that given out by a recently killed goose.

12. 3d. The *period of florescence.* The eruption continues generally in full force for nearly three days, namely, from the fifth, when it is usually fully out, till the seventh, when it subsides; but this stage presents no distinct marks from the foregoing, for the eruption on the face and neck generally declines on the sixth, whilst it is fully out on the body and limbs, or even only breaking out on the lower extremities. The stigmata coalesce more closely, the skin becomes more uniformly red, tense, or turgid, extremely hot and itching; and the tumefaction of the face and eyelids, particularly on the fourth and fifth day, is very marked. The tongue and fauces now evince an evident participation in the eruption. The fever and catarrhal symptoms show scarcely any remission, but are even sometimes encreased. Intolerance of light, dryness of the nostrils, hoarseness and dyspnœa, and a hoarse clangous or barking cough, at first dry, and afterwards frequently followed by the expectoration of a thin mucus, containing dense, rounded, albuminous particles, continue during this period. Towards evening, the fever, restlessness, and heat of skin increase. Sometimes a slight diarrhœa occurs, from which the patient experiences some relief. The urine is generally of a deep colour, and scanty.

13. 4th. *Period of desquamation.* On the seventh and eighth days from the commencement of the first stage, the eruption declines on all the upper part of the body; but the subsidence and desquamation of it have generally begun a day or too earlier on the face and neck, the turgidity of which is now much diminished. On the eighth and ninth days, and in the same order as the eruption appeared, it subsides, with desquamation of the cuticle; and on the tenth and eleventh days it has entirely disappeared, leaving in its place a furfuraceous desquamation, passing off generally with an encreased and troublesome itching, and a slight moisture on the surface. The more prominent and copious the eruption, the more marked the desquamation becomes. Generally, when the eruption is very slight, the skin continues unchanged. In the course of this stage, critical perspiration, a copious sediment in the urine, and free evacuation, frequently supervene and contribute to its felicitous termination. But the pectoral symptoms usually continue longer, and occasionally with encreased severity, particularly the cough, hoarseness, and the expectoration already described. With the subsidence of these, the system returns to the healthy state.

14. ii. MODIFICATIONS, COMPLICATIONS, AND IRREGULARITIES OF MEASLES. — There are various circumstances which contribute *to modify the progress and character of measles.* Of these, the most important are the prevailing nature of the epidemic, the season of the year, the state of the atmosphere in respect of temperature and moisture, the nature of the locality, the ventilation of the place and apartments, the previous health of the patient, and his temperament and habit of body. But I believe that there are few causes proper to the individual that has greater influence on the character of the disease than the vital powers of the system, and the disposition which the patient may possess to affections of some vital or important organ.

15. *A. Measles with predominance of Inflammatory Character.* — *a.* This form of the disease is

generally ushered in with marked febrile symptoms of the inflammatory type; full, strong, or oppressed and frequent pulse; great heat of skin; a phlogistic appearance of the blood drawn from a vein; severe catarrhal symptoms, with acute coryza; marked injection and turgidity of the conjunctiva; watery discharge from the eyes; constant cough, with oppression at the chest, great difficulty of respiration, bloody sputa, and other symptoms of inflammation of the mucous membrane of the air passages and lungs, and occasionally with acute pain and other signs of pneumonia or pleuro-pneumonia. The eruption appears rapidly and copiously, with convulsions in young children, and delirium in older patients; or at least, with most severe pains in the head; after which, a slight amelioration is sometimes observed. The eruption is more intensely red, more prominent, and more closely coalescent, so as to occasion a nearly erysipelatous redness and tumefaction of the face and other parts, than in the common form of the disease. Desquamation also often takes place earlier, and is not infrequently complicated with, or followed by, marked inflammation of the lungs and bronchial membrane; or even by various modifications of croup.

16. This state of the disease is most frequent during the epidemics which occur in winter and spring; in persons of a robust, sanguine, and irritable temperament, and plethoric habit. It occurs *sporadically* in those who are exposed soon after infection to cold in any form, particularly to a cold dry air after the body has been heated; and in children who are teething, and who have been highly or grossly fed, and kept in warm apartments, and are of an inflammatory and plethoric habit.

17. *b.* This form of measles is so very frequently *complicated* with serious *inflammation of the air-passages and lungs*, and is so liable to kindle up those diseases, towards its decline, or to dispose to them during convalescence, that strict attention should be directed to the circumstance.

18. *α.* When extensive or severe *bronchitis* occurs during the course of this type of measles, the patient is often suddenly attacked with great difficulty of breathing; the face is pale, if it precede the eruption, but generally somewhat livid, or of a deep crimson, if it occur during the eruption. Sometimes the eruption either appears only partially, or recedes prematurely; the lips are also livid; the chest and diaphragm, as evinced by the motions of the abdomen, labour much during respiration, and a sonorous, sibillous, and, lastly, a mucous rhonchus, is heard on auscultation. The countenance becomes anxious; the expectoration is more or less abundant, and attended with severe paroxysms of cough; the pulse is quick, small, or oppressed; and the skin either cool or warm in parts only. This state of disease is not merely a severe form of bronchitis, but an association of it with congestion of the lungs, to which a similar state of the brain is sometimes superadded. The pulmonary affection, in this severe form, may soon terminate the life of the patient, chiefly in consequence of the effusion which takes place in the air passages, together with the loaded state of the vessels of the encephalon.

19. In the less severe forms of the complication of bronchitis with measles, or when the bronchitis is not conjoined with congestion of the organ, the symptoms are less marked; there is less urgent oppression at the chest, and the lividity of the countenance is generally absent. But these less severe states of bronchitis not infrequently superinduce inflammation of the substance of part of the lungs or of a whole lobe. In this case the sputum becomes more purulent, more rounded, and sometimes streaked with blood; respiration is puerile in the vicinity of the affected part, in which the respiratory murmur is either feebly heard, or is attended by crepitating rattle, or the sound is no longer detected in it, whilst the chest is dull, in this situation, upon percussion. At the same time the respiratory motions are quick, laboured, unequal, and imperfect.

20. *β. Pleuritis* may occur during the course of this type of measles; and the inflammatory action may either originate in, or may extend to, the pleura from the affected part of the lungs. But in either case we seldom find in measles that the pleura becomes inflamed without a portion of the lungs participating in the diseased action. The presence of acute pain generally indicates this complication, with immobility of the ribs, quick inspiration, and slower expiration, and pain on percussion, which gives no further information, unless effusion has taken place, when a dull sound will be emitted, and the œgophonous sound heard on auscultation. This form of complication not infrequently terminates in hydrothorax, particularly after the disappearance of the eruption.

21. *γ.* Another severe and dangerous *complication*, viz. *croup*, sometimes occurs in this form of measles. It generally appears during the stages of eruption and florescence, and more rarely subsequently. It is chiefly characterised by hoarseness and ringing croupy cough, followed by difficult and sibillous inspiration; by soreness and tumefaction about the larynx and trachea; and by the expectoration, after the paroxysms of strangulating cough, of a ropy clear fluid, sometimes with membraneous threads. It very seldom happens that the inflammation of the larynx and trachea, constituting the croupy complication, occurs without some degree of inflammatory action being extended to the bronchi, or even to a portion of that substance of the lungs. When a fatal termination occurs in this state of disease, the air-passages present more or less of the usual marks of inflammatory action, and are loaded with a thick tenacious mucus, or contain false membranes, or both.

22. *B. Measles with predominance of Gastric and Bilious Disorder.* — *a.* This form was first described with accuracy, and the importance of attending to its character pointed out, by STOLL. It is chiefly marked by accumulations of sordes in the stomach and bowels; by loaded tongue; pain and tenderness at the epigastrium, hypochondria, and bowels; by morbid, bilious, and offensive alvine evacuations; by the great severity of the cough; by depression of the energies of the frame; the slower and less abundant eruption on the skin; by weakness and frequency of pulse; and by severe pains in the loins, limbs, and forehead. It sometimes characterises summer and autumnal epidemics, particularly during or soon after warm and moist seasons; and it occurs sporadically in weak children during the periods of the first and second dentition; in the imperfectly nourished, and in those who have had their bowels long neglected.

23. *b.* This form of measles is frequently *complicated* with *irritation* of the mucous surface of

the *stomach*, or with *disorder* of the *liver*. But, when this latter organ is principally attacked, it is more generally *congested* than otherwise affected. The complication of this modification of measles with *gastric irritation* is very frequent in children during the periods of dentition, and is generally indicated by nausea and vomiting, tenderness or pain, or heat at the epigastrium; an imperfect, impeded, or irregular state of the eruption, and its premature disappearance. *Congestion of the liver* is much more seldom met with, and chiefly occurs in older subjects. It is generally attended by pain and fulness in the right hypochondrium, sallowness of the countenance, an irregular and morbid state of the alvine evacuations, and a dark, muddy state of the urine.

24. *c. Diarrhœa* is not an infrequent complication in this form of measles. It may appear early in the disease. When this is the case the eruption is often delayed, or it is scanty, imperfect, or irregular. It may also take place during the period of desquamation, assuming the character at first of a salutary crisis; but, in consequence of error in diet, or exposure to cold, putting on a more serious appearance, or even passing into a state approaching to dysentery. When this occurs, the appearance of the evacuations, and the state of the cutaneous surface, require the attentive examination of the practitioner, as being the chief guides to this state of the disease, and to successful treatment. Dr. Abercrombie, of Cape Town, described to me an epidemic prevalence of measles in the colony which presented much of this character; the complication with *diarrhœa*, or *enteritis*, or dysentery; or the supervention of these during the decline of the measles, or even some time after recovery from that disease, being very frequent and uncommonly fatal.

25. *C. Measles with predominance of the Nervous Character.* — In this form of the disease the patient is, from the commencement, much depressed in mind; is severely affected with chills and rigors, which pass into a burning heat, with inquietude, general pain and lassitude, particularly about the loins and limbs, with delirium or somnolency, leipothymia, harsh heat and dryness of the skin, and dry loaded tongue. The eruption sometimes appears as early as the second or third day, frequently with convulsions, and rapidly extends to all parts of the body. The patches of the eruption are scarcely at all, or only slightly, prominent; are paler than the regular disease, and more readily disappear. The febrile and nervous symptoms are never diminished; but, on the contrary, encreased by the eruption, particularly if it disappear prematurely, or is repelled by any cause. Sometimes, still more severe and frequently fatal symptoms accompany this form of the disease; such as dyspnæa, dry cough, anxiety, oppression at the chest and præcordia, cardialga, dryness and trembling of the tongue, dryness and redness of the fauces, loss of voice, vomiting, loss of recollection, with stupor, starting of the tendons, tumefied abdomen, very quick, weak, soft, and open pulse, and a crude scanty urine. The character of the disease so nearly approaches to the typhoid type of fever, that it has been termed by several authors typhoid measles. Critical evacuations sometimes occur towards its close, or abortive efforts at evacuation, occasioning fatal determination to some weakened organ, or subsequent visceral disease, which can be removed with great difficulty only. The cuticle is frequently not thrown off in this form of measles.

26. Measles with the nervous character occurs generally at the same season and in the same class of subjects as the foregoing variety (§ 22.). It characterises certain epidemics, particularly those which occur at the same period as epidemic continued fever; and it evidently evinces a more marked determination of the febrile action towards the large nervous centres, particularly the substance and membranes of the brain. This determination is often remarkably encreased about the eruptive and subsequent stages, or upon the imperfect appearance of the eruption, or its repression.

27. *D. Measles presenting a malignant or septic character.* — *Rubeola maligna; R. Putrida; R. Septica;* Auct. var. — To many of the symptoms which I have detailed, as marking the *nervous form* of measles (§ 25.), are generally superadded, most commonly during the stages of *eruption* and *florescence*, or occasionally somewhat later, the eruption of petechiæ, lividity and soreness of the fauces and throat generally; an exudation, or more copious flux of dark decomposed blood from the nostrils, mouth, or vagina; a profuse and exhausting diarrhœa; dark offensive motions; dysenteric symptoms, and viscid perspirations. The measly eruption becomes, either previously to, or contemporaneously with, the above symptoms, discoloured, of a deeper and darker red, or livid; and the cuticle is readily rubbed off upon the decline or detumescence of the papulæ. This form of measles presents a similar state to that of purpura hæmorrhagica, or of land scurvy, complicated with the exanthematous fever.

28. Malignant measles occurs chiefly in hot, warm, moist, and miasmatous climates, in close or crowded localities; and during hot and moist seasons, in cachectic habits, in the ill-fed, or in those in whom the energy of the digestive and assimilatory functions is greatly impaired, and who have been subjected to those agents which act most injuriously on the powers of life and the tonicity of the moving fibres; contaminating the circulating fluids, and occasioning the liquescence of the soft solids of the body. I have seen it prevalent in the natives of warm climates, and in those who inhabit marshy, moist, and miasmatous districts, both in temperate and warm seasons. I have likewise observed it in natives of some of the northern countries of Europe who have been imperfectly fed, and whose only animal food consisted of fish, frequently stale, and eaten with little salt; or who have lived in ill-ventilated, and low apartments. The nervous form of measles occurs most commonly in scattered or isolated cases, whilst the malignant variety more commonly presents an epidemic character, the former more evidently depending upon individual predisposition; the latter to more generally prevailing causes, as unwholesome food or modes of living, general scarcity of provisions, deleterious miasms, and epidemic constitutions of the atmosphere.

29. *E.* Of *certain irregularities often presented by measles.* — *a.* Sometimes the eruption is more

languid, or *retarded* beyond the usual period. It may likewise be *precocious*, *precipitous*, or *irregular*, as to the parts on which it appears, and the succession of its progress. The form and character of the eruption may differ greatly: it may be very pale or very red, dark red, or even livid, as in the malignant form; it may likewise be scarcely perceived rising above the rest of the cutaneous surface, nearly smooth; or it may be very prominent and rough to the touch, and discrete; or it may coalesce so closely as to appear confluent. As respects the period of its disappearance, this may be premature, and the desquamation subsequently be either imperfect or altogether wanting.

30. *a. Measles without the catarrhal symptoms — Morbilli sine catarrho* auctorum — not infrequently occur during the epidemic appearance of the disease; or an eruption presenting all the characters of measles sometimes is met with, but without the usual catarrhal symptoms, and without, or with slight febrile commotion. This variety was first described by WILLAN; and as it does not protect the constitution from the regular form of measles, it is considered by FRANK, HILDENBRAND, and WILLIAMS as *spurious*, and as an eruption only resembling measles, and symptomatic of gastric disorder. Dr. G. BURROWS, however, thinks that this objection cannot be admitted; for, besides the opinion of WILLAN, BATEMAN, and others, that it is a distinct variety, the recurrence of measles in the same person has been seen by these and other writers. In the most of the cases of this eruption that I have observed, the stages of the disease wanted the regularity of true measles, and the desquamation was not so marked or complete as in them. In many also of the imputed instances of a second attack of measles, some doubt may be entertained as to one or other having been the regular disease. I believe, however, that I have seen instances of an undoubted second attack.

31. *b. Measles without the eruption — Morbillous fever without the exantheme. — Febris morbillosa sine exanthemate*, HILDENBRAND. — Several writers have contended, that, during the epidemic prevalence of measles, some children may have all the catarrhal and febrile symptoms of measles, and yet no eruption will appear, such children notwithstanding being protected against a subsequent attack. I have met with two or three instances, when measles was prevalent in a family, of one of the children having all the catarrhal and constitutional symptoms, without any eruption appearing, and have attributed this to impaired vital power, to an anæmic state of the vascular system, and to impaired vascular action, probably also associated with predominant disorder of some internal viscus. I have seen other instances where the disease has advanced far, the febrile symptoms having continued for several days, when a scanty, imperfect, or evanescent eruption has at length appeared after the exhibition of stimulants or tonics.

32. *c*. The connection of *hooping-cough* with measles has frequently been remarked upon. Indeed the occurrence of measles sometimes presents a very intimate association with pertussis, the epidemic appearance of the one being frequently followed by the other, and the attack of the one being often followed closely by the other, in the same subject. Some physicians, as DE HAEN and MACBRIDE, conceive that they have seen measles associated with *small-pox* in the same person. But I agree with REIL and HILDENBRAND in considering this opinion to have originated in mistake.

33. III. The TERMINATIONS OF MEASLES.—i. *Resolution* or *restoration* to the healthy state usually takes place from the resistance which the vital energy opposes to the morbid changes characterising the disease, and to the influence of this energy on those organs which are the emunctories of the frame. When the train of phenomena is not interfered with, the disease frequently, about the seventh or ninth day, presents some critical evacuation, which tends greatly to the restoration of the healthy functions, especially a copious and general perspiration; a paler and more abundant secretion of urine, which deposits a copious sediment; diarrhœa continuing for two or three days, but readily becoming hurtful if it be not judiciously managed; a copious discharge of mucus, which often removes the remaining irritation of the bronchial surface with the hoarseness; and the furfuraceous discharge and transpiration which takes place from the cutaneous surface after the exfoliation of the cuticle.

34. ii. *The sequelæ of Measles.* — *A*. Sometimes, not only the irregular and complicated states of measles, but even the more benign and regular form, leave after them, without any evident cause, various diseases which place the lives of patients in great hazard. The chief of those are pulmonary consumption, the result either of a chronic state of the bronchitis which had accompanied the measles, or of organic lesion of the substance of the lungs, the consequence of the complication of the disease with pneumonia, or with broncho-pneumonia, readily passing into chronic pneumonia, or of tubercles which had been developed during its progress and decline, or which had previously existed. It is by no means rare to observe both pneumonia and pleuritis, or both conjoined, supervene during the period of desquamation. The accession of the former especially is often extremely furtive and latent. I have frequently seen patients brought to the Infirmary for Children with the most severe attacks of pneumonia, in an advanced stage, with all the symptoms fully developed, following an apparently mild form of measles; and other cases, which had manifestly been advancing for several days in a concealed manner, and gone on to serious organic change before the parents had been alarmed. These latter are very frequent during some epidemics, and particularly after the inflammatory form of the disease, although they are not peculiar to this variety, but equally consequent upon the regular, and sometimes on the gastric states of the malady. In cases of this description the practitioner has often no opportunity of watching the accession of the local mischief, which may occur so early in the disease as to be a complication of it, or during the stage of desquamation. I have, however, observed it still more frequently —I may say in many hundred instances presented to me in the institution already referred to — at an indefinite, but no very remote period from the last stage, occurring generally during recovery,

either from an incautious exposure to the air, or to cold, early in convalescence, or from an injudicious management of this period, which, in all exanthematous diseases, requires the particular care of the physician in order to prevent their dangerous sequelæ — often more dangerous than even the original diseases themselves. Improper diet, premature exposures to cold, and even atmospherical vicissitudes, which cannot be sufficiently guarded against, will also frequently occasion the unfavourable consequences now pointed out.

35. *B.* The *Symptoms* indicating the supervention of disease of the lungs are often extremely treacherous, particularly if the local mischief commences early in the disease, and if viewed superficially, or without the aid of percussion and auscultation. They chiefly consist of the persistence of cough, expectoration, frequency of pulse, and febrile exacerbations, after the disappearance of the eruption. Or, the different stages of the measles having been completed, febrile action is rekindled and accompanied with oppression, weight or uneasiness in the chest, with a dry, spastic cough and difficulty of breathing, followed after a time with purulent expectoration, occasionally streaked with blood, evening exacerbation of fever, nightly perspirations, loss of flesh, &c. In those cases which are characterised by a gradual or insensible concentration of diseased action in the lungs, particularly in the mucous surface of the bronchi and air-cells, the expectoration which supervenes in the latter stages, gradually changes from a clear whitish thin fluid, containing numerous white albuminous specks or flocculi, to a thicker, more opaque, tenacious, and muco-purulent matter, till it at last becomes more decidedly purulent; the sputa being each distinct and rounded, less tenacious, not running into each other, and forming a viscid stringy substance, adhering closely to the sides of the vessel, but a yellowish, rounded mass which imparts a whitish, turbid appearance to the water in which it is thrown, from mixing partly with this fluid. But these and other symptoms, although most certainly indicating serious disease of the lungs, give us no precise information as to the extent and nature of the existing lesion. This is only to be acquired from an attentive and repeated examination of the chest by means of percussion and auscultation, and from weighing the evidence thus furnished us in connection with the rational symptoms in the manner pointed out under the articles where these subjects more appropriately fall. The above remarks are equally applicable to the occurrence of pleuritis either as a complication or as a sequela of measles. When pleuritis, or pleuro-pneumonitis, does occur in either of these ways, it is extremely prone to terminate in effusion of a serous fluid into the pluræ, as adhesions are less readily formed in pleuritis when thus complicated than when occurring in an idiopathic form.

36. But effusion into the chest, and even into the pericardium, may be consequent upon measles without any previous signs of inflammatory action. When these results supervene, the disordered state of the respiratory and other functions, and particularly the information conveyed by percussion and auscultation of the chest, will generally point out the nature and extent of mischief. Other dropsical effusions, particularly anasarca, hydrocephalus, and ascites, occasionally are observed as sequelæ of measles, and may be imputed either to encreased determination of the circulation to, with diminished tone of, the extreme capillaries terminating in serous surfaces, or to congestion of the vessels, particularly those conveying the blood from the adjoining viscera and parts. As in anasarca, so also in the other forms of dropsy, the obstruction opposed to transpiration by the state of the cutaneous surface, may determine an encreased exhalation or secretion of serum into the cellular tissue underneath and into the shut cavities. The occurrence of anasarca after measles from granular disease of the kidneys is seldom observed.

37. *C. Enteritis,* in some one or other of its forms, more commonly appearing as muco-enteritis, or commencing in the mucous surface of the intestines, is a not infrequent sequela of measles, either upon the disappearance of the eruption or during convalescence, particularly in some epidemics. In the remarkable epidemic which appeared at the Cape of Good Hope about 1838, where the disease had not existed for thirty years, and which few under thirty years of age escaped, this sequela was much more fatal than the measles itself, although of a very severe form. (See art. INTESTINES, *Inflammation of.*) — *Diarrhœa,* acute or chronic, the former being often inflammatory and passing into enteritis as just noticed, or lapsing into the chronic state, not infrequently with ulceration of the intestines, is often observed consecutively upon measles.

38. *D. Ophthalmia* of a chronic and obstinate character frequently follows the malady, particularly in the fair and scrofulous diathesis. In addition to these, scrofulous sores and affections of various kinds; enlargements and inflammations of the lymphatic and mesenteric glands; aphthæ and ulcerations of the cheeks and gums; furunculi and abscesses of the cellular tissue, and fluor albus, should also be ranged amongst the sequelæ of measles.

39. *E.* When the disease occurs in females who have reached the period of puberty, it may be followed by various irregular forms or manifestations of *Hysteria,* sometimes connected with disorder of the catamenia. Of these, hysterical or nervous cough, occasionally with aphonia, is one of the most common, and always requires a treatment suited to its hysterical character.

40. *F.* A more particular consideration of the above *sequelæ* of measles is not consistent with my limits. The mere reference to them serves to illustrate the nature of the disease, whilst it warns the practitioner as to what may occur, and hence points out to him what should be guarded against. These sequelæ, moreover, show that the inflammatory character of measles is variously modified in respect of the degree of vital energy, and nervous power, with which the vascular system and the tissues generally are endowed, — that all the vital manifestations, and even the cohesion of the textures, are seriously modified in its progress, particularly in certain of its types, — and that whilst morbid action of an acute and febrile kind may exist, even in an extreme grade, it may be at the same time conjoined with great diminution of the nervous functions and vital energies.

41. iii. Not only may *measles terminate in a return to health, and in other diseases tending*

generally to disorganisation, but they may terminate, *in a more immediate manner, in death.* This seldom occurs sooner than the stages of efforcescence and desquamation, but cases have occurred in which a fatal issue has taken place about the period of eruption — congestion of either the lungs or brain, or even both, occurring either alone, or in conjunction with effusion of serum &c. into the air-cells and small bronchial tubes of the former, and in the ventricles and between the membranes of the latter, and quickly arresting the functions of these vital organs. In the later stages of measles death generally occurs in a more gradual manner, and may be imputed — 1st, to inflammatory disorganisation, commencing and rapidly advancing in some vital organ, either as a complication or as a consequence of the general febrile commotion and constitutional affection constituting the disease. In these cases the eruption may be extremely abundant, premature in its appearance and decline; but it is much more commonly either late, extremely scanty, irregular in its course, or even scarcely appearing. — 2d. A fatal result may be occasioned by the extreme degree of general adynamia, or depressed state of the vital energies, owing to which reaction cannot take place sufficient to restore the different functions of the œconomy to their natural state; or the vital manifestations of the different organs are incapable of sustaining the struggle with, and removing the morbid impression made upon, the nervous energies, and through them upon the different emunctories, secretions, and circulating fluids, by the exciting cause of the disease, aided by the different concurrent influences of individual pre-disposition and pre-existing disorder. — 3d. A fatal result may occur in any of the advanced stages of the disease from the combination of these two principal pathological states, either of them existing in a more marked degree than the other, in different cases, in different epidemics, and in different seasons.

42. iv. Appearances observed in fatal Cases of Measles. — These vary according to the nature of the prevailing epidemic, the season of the year, the severity of the attack, and the individual predisposition and state of health at the period of seizure. The lesions detected after death have generally a strict reference to the particular type of the disease, and to the complications which had existed in its course. The *regular* and *uncomplicated* measles never terminates fatally unless serious or dangerous visceral disease occurs on its decline, and ends unfavourably. It is different, however, with the other types or states of the disease. — *a*. In fatal instances of *inflammatory measles*, the lungs always present more or less change. The mucous surface of the air-passages is vascular, of a reddish or dark-red colour, generally in patches of a small size, somewhat softened and turgid, and covered with either a mucous, muco-puriform, or viscid matter. In those cases which have presented signs of the croupy or bronchitic complication, the above appearances are very marked about the larynx, epiglottis, and trachea, and are sometimes accompanied either with infiltration and injection of the sub-mucous tissue, or with a thick, whitish, albuminous exudation, approaching in parts to an imperfectly formed membrane; but this latter is, as far as my observations have gone, extremely rare. The above changes are more commonly observed in the large and small bronchi, where the accumulation of viscid mucus, containing whiter and denser specks of an albuminous appearance, is sometimes very great. Accompanying these states of the air-passages the lungs are often congested with a dark, frequently fluid, or semi-fluid blood, a similar congestion likewise existing in the veins and sinuses of the encephalon. After the more decidedly *pneumonic complication*, serous, or sero-sanguineous infiltration of the air-cells and connecting cellular tissue, hepatisation or condensation of portions of the lungs, purulent infiltration of parts of this organ, or the formation of small purulent collections with disorganisation of the immediately surrounding structure, and, lastly, inflammation of the pleura, are the lesions which usually present themselves. When *pleuritic* symptoms occur during the last stages of the disease and terminate fatally, effusion of a turbid serum to a greater or less extent, injection and softening of parts of the pleura, and more or less lesion of the subjacent lung, are usually observed.

43. *b*. In the *nervous type* of the disease, the brain is generally much more vascular than natural, and occasionally somewhat softer; the veins and sinuses are congested, and serum, in various quantities, is frequently found in the ventricles and between the membranes. The pia mater is also generally more than usually vascular, and the arachnoid more or less opaque. These lesions vary greatly in degree. Sometimes they are most remarkable on the surface of the hemispheres; but I have observed them most frequently about the base of the brain. The extent of morbid change has frequently no relation to the severity of the nervous type during the progress of the disease. In some cases these appearances are very slight, and yet the character of the disease has been marked and severe. In other cases the lesions have been considerable, yet the nervous symptoms have not been proportionately great. It seems as if the manner in which the energies of life are influenced, has an intimate relation to the intensity of disease and the manifestations of the nervous functions in its progress.

44. *c*. In the *gastric* and *bilious* type of the disease, the morbid appearances are generally most marked in the mucous surface of the stomach, intestines, and œsophagus, and consist chiefly of inflammatory injection, in patches or small grouped specks, and of softening or loss of cohesion of the mucous membrane, sometimes with injection and slight infiltration of serum in the sub-mucous cellular tissue. The liver does not often present much appearance of disease, — seldom more than slight injection or congestion of the portal and hepatic veins, — the biliary derangement when it accompanies the disease being more functional than inflammatory.

45. *d*. I have had occasion to observe a few inspections of fatal *malignant* measles, but only three in this country where this character was marked. The most remarkable features in these inspections were the softness of the tissues and the facility with which they might be torn — characters in which even the heart itself participated. The serous cavities sometimes contained a small quantity of serous fluid of either a turbid or sanguineous appearance. I have observed this kind of effusion in the pericardium, but more frequently in the

pleura. The lungs were generally congested, and the mucous surface of the bronchi, as well as some parts of that of the digestive canal, were of a darker colour, even without any very marked injection of the vessels further than engorgement of the small veins, than in other cases of the disease. The bronchial mucous surface presented, in parts, small livid or purple ecchymoses, similar marks also sometimes appearing in the fauces, stomach, and cæcum.

46. The veins and sinuses of the brain were generally engorged with a dark, semifluid blood. The auricles and large veins contained blood in a similar state. The surface of the body was livid in parts, mottled, and dotted with petechiæ of a dark colour, approaching to the characters of purpura hemorrhagica.

47. v. *Tissues most uniformly affected in Measles.* — The structures specifically affected by this disease are the rete vasculosa of the skin, the mucous membranes, particularly those lining the air-passages, and, in a lesser degree, those of the fauces and stomach. The redness observed in the mouth and throat during the stages of eruption and florescence is seldom so intense as in scarlatina. The other lesions of structure observed after measles may partly be attributed to the interruption of those functions performed by the cutaneous and mucous surfaces, and to the consequences thereby produced on other organs associated with them in action, together with the influence of the efficient cause of the disease on the nervous and vascular system, on the circulating fluids, and, indeed, on all the vital manifestations, and even on the organisation of the frame. These latter, or more extreme changes, however, are chiefly manifested in the more severe or malignant cases, and are not dissimilar from those which take place in the advanced course of low or adynamic fevers, whether exanthematic or simply continued.

48. IV. DIAGNOSIS.—An exact knowledge of the symptoms and course of the disease in each of its stages, and in all the states and forms it may assume, having at the same time regard to its origin, its causes, and the character of the reigning epidemic, will generally enable us to distinguish it from all other maladies of a similar kind. — *a. Miliary fever* will seldom be confounded with measles, as its phlyctenæ, containing a serous or whitish fluid, scarcely ever appear on the face, and are always accompanied by perspirations of an acid and strong odour. — *b. Urticaria* is distinguished from this disease by the itching attending it, by the larger and more elevated papulæ appearing and disappearing without any order, and by its more fugacious character. — *c.* The *exantheme* frequently accompanying *true or contagious typhus,* particularly as described in the article FEVER (§ 500—503.), has a close resemblance to the declining eruption of measles. It is, however, readily distinguished by the history of both diseases, unless when the measles assume the nervous character. In this case the difficulty of diagnosis is much increased. But the more protracted stages of typhus, the profound typhomania, and the persistence of the eruption long beyond the period of its disappearance in measles, with various other subordinate features, will generally point out its nature to the attentive observer. — *d.* The early stages of *small-pox* may also be mistaken for measles; but the marked catarrhal symptoms ushering in the latter, the troublesome cough, the small size of the stigmata, their superficial, slight, and less circumscribed character, and the absence of hardness, will readily distinguish them from the incipient eruption of small-pox.—*e.* The diffused, comparatively smooth, light, scarlet redness, the severe affection of the fauces, the early appearance at once over all parts of the body, and its occasional sudden subsidence and return, the burning heat and dryness of the eyes, and the tendency to affection of the digestive mucous surface, mark *scarlet fever,* with which, however, measles have many points of resemblance, fully pointed out under that disease. It has been remarked by ZIEGLER, and my own experience confirms the justice of the observation, that whilst measles evince a disposition to affect the respiratory apparatus, scarlet fever has a manifest tendency to disorder the cellular tissue. I may add to this, that this latter disease is more intimately associated with a disordered state of the digestive mucous surface, and that this surface is more liable to be diseased in the severe forms of the malady, or after the sudden subsidence of the eruption, than is usually observed to occur in measles. —*f.* As to *rubeola,* or that intermediate disease between measles and scarlet fever, I will not here point out its distinguishing characters from either one or the other, as this subject is more fully considered in the article RUBEOLA. — *g. Roseola* is often distinguished with some difficulty from measles; but it may generally be recognised from the circumstance of its being generally sympathetic of dentition, dyspepsia, and a disordered state of the digestive organs. It is very seldom preceded by any very marked fever, or depression of the voluntary powers and vital actions, and is not accompanied by the catarrhal symptoms characterising measles. It does not superinduce the morbid affections so frequently observed after this disease.

49. V. PROGNOSIS. — The *prognosis* in measles is in many respects dependent on the type and complication of the disease. Measles is generally less dangerous than the small-pox and scarlet fever. The *benign* or common form is scarcely attended with any danger, unless as respects its sequelæ, or when officiously interfered with. The *gastric form* of the disease is more serious, but this seldom presents much danger if it be judiciously managed. The *inflammatory state* should lead us to give a cautious opinion of the result, particularly if it be complicated with croup, bronchitis, pneumonia, pleuritis, or hæmoptysis. Of these croup, pneumonia, and hæmoptysis, especially the last, are very dangerous complications. I have met with several cases of hæmoptysis in the different stages of measles, but the larger proportion of them has terminated fatally sooner or later, under treatment varied according to the features of each case. The *nervous* and *adynamic* or *malignant* forms of the disease are seldom devoid of danger, particularly the latter.

50. Much also depends upon the *character of the reigning epidemic,* which usually, indeed, assumes some one of the varieties into which I have divided the disease. Some epidemics are so mild as scarcely to cause any apprehension as to the result. Others are so severe as to lead us to

dread either the immediate or more remote consequences. PERCIVAL states that 91 died out of 3807 cases. WATSON had in the London Foundling Hospital 1 death in 10 cases, and in another year, 1 in 3. In 1793, 6 cases died out of 69; and in 1794 none died of 28 cases, in this institution. In 1800, out of 66, 4 died. These results confirm the calculation of HOME, who estimated the deaths at 1 in 12. The *seasons* have also some influence, but chiefly in sporadic cases; for, during the epidemic prevalence of the disease, their tendency is lost in the more predominating character it then assumes. Winter, however, is a less favourable season for the disease than summer and autumn.

51. *a.* A premature or retarded eruption generally indicates a severe disease, and one disposed to an irregular form and complicated state. An obstinate, severe, and hoarse cough, accompanied with difficulty of breathing, and much febrile action, prolonged beyond the period of desquamation, evinces a serious affection of the lungs, and danger. Tumefaction of countenance; a pale, yellowish eruption, intermingled with petechiæ; copious perspirations without relief of the symptoms, but indicating relaxation of the tissues and of the tone of the extreme vessels; profuse diarrhœa; hæmorrhages, particularly those from the air-passages and fauces; livid petechiæ; a dark or livid state of the eruption; gangrenous spots or escars; very great debility or exhaustion; a very frequent, very soft, open, or compressible pulse, or an irregular or intermittent pulse; and the presence of nervous symptoms in a marked degree, particularly spasms or convulsions, are severally most *unfavourable symptoms.* The disease is generally more severe in children during dentition, and in young persons near the period of puberty; also in infants during the first or second or third month. Convulsions preceding the eruption, especially during dentition, are unfavourable signs. Adults who have a tendency to pulmonary diseases, or who have previously been affected with them; those of a phthysical or scrofulous diathesis; persons addicted to the abuse of inebriating liquors, and females in the pregnant or purpureal states, generally experience the disease in a severe form. However, the measles are far less dangerous to pregnant women, than either small-pox or scarlet fever.

52. The sudden disappearance of the eruption, followed by symptoms of internal disease, or by aggravation of pre-existing visceral disorder, is generally followed by an unfavourable termination. The danger is also great in proportion to the extent and confluence of the eruption, and the violence of the attendant fever. The later the eruption is in supervening upon the fever the better; the earlier the worse. Very great lassitude, torpor, and rheumatic pains of the limbs, if experienced long before the eruption, indicate a disease of great severity. Difficult dentition, and whooping-cough, concurring with measles, place the patient in danger. A fatal issue, within the course of the disease, occurs most frequently on the ninth and tenth days. It has been supposed by some writers that measles has become more severe since the introduction of vaccine inoculation; but I agree with HILDENBRAND in considering this to be devoid of foundation.

53. *b.* The *favourable* indications which occur during the disease are, a moderate eruption with a mitigation of the fever; a disposition to an equable moisture on the skin; a moderate or slight cough, with a mucous and easy expectoration; a free and unembarrassed respiration; a free state of the bowels, and moderate relaxation of them towards the close of the disease; hypostatic urine; a regular succession of the changes of the eruption; and no appearance of any irregularity or complication with visceral affection, the existence of which, as I have already shown, often occasions a fatal result at a more or less remote period, owing to the tendency to disorganisation being greater in the local affections occurring than when taking place primarily.

54. VI. CAUSES. — The *infectious* nature of measles is sufficiently demonstrated, and requires neither proof nor comment. — *a.* The *distance* to which the emanation from the body of an infected person may infect a sound one has not been shown, nor, indeed, is it capable of satisfactory demonstration; for it must depend upon the stage and virulence of the disease, and the susceptibility of those exposed to the emanation. It is probable that the infectious effluvium commences to emanate from the subject of the disease from the first appearance of the eruptive fever, and that it encreases in activity until the period of desquamation, after which it declines; but it has not been shown satisfactorily when all power of infection ceases. That the infectious effluvium is formed as early as during the primary fever, and before as well as after the appearance of the eruption, has been proved by several occurrences by which exposure to infection has been limited to certain periods of the malady.

55. *b.* As in other infectious maladies, so in this, the infection is extended and the disease perpetuated, even after periods of its apparent cessation or disappearance, by *fomites,* or by the imbibition and retention, for a considerable period, of the miasm given out by the infected. DR. WILLIAMS adduces an instance of this, and similar instances on a smaller scale, as respects the results, must have occurred to every physician. A boy from the Foundling Hospital visited at a house where a child was ill of measles. The boy returned in the evening, and mixed with his fellows as usual; but in the course of fourteen days he and sixty boys were ill of the disease. The experiments of HOME, SPERANZA, and others have furnished numerous other proofs of the propagation of the disease by fomites.

56. *c.* Although the chief modes in which the malady is disseminated are emanations proceeding directly from the sick, and emanations absorbed and retained for a time by woollen or porous bodies, and afterwards given out, still it may be spread by *contagion* and *inoculation.* HOME, VOGEL, WACHSEL, BROWN, MONRO, and TISSOT have proved the contagious nature of measles by inoculation, either with the blood, or with the serum taken from the vesicles which are occasionally intermixed with the eruption. It was supposed by some of the physicians just mentioned, that a mild form of the disease was produced by inoculation; but the experiments made by CULLEN, ROSENSTEIN, GIRTANNER, and VAIDY have not confirmed this opinion; and the inoculation of measles has never been even partially adopted.

The latest trial seems to have been made by SPERANZA in 1822, who inoculated seven persons, who had the disease regularly and mildly.

57. *d.* The *latent period*, or the time which elapses from the impression of the morbid effluvium on the sound constitution until the appearance of the eruption, varies from six to twenty-one days. In the cases of the inoculated disease, the eruption appeared on the sixth and seventh days. (See art. INFECTION, § 31.)

58. *e.* The morbid seminium or poison of measles may *co-exist* with some other morbid poisons, as observed by various pathologists. MACBRIDE states, that he occasionally saw measles and small-pox in the same patient at the same time, and that the combination was generally fatal. The co-existence of these maladies, either taking the precedence, has been noticed also by DE HAEN, VOGEL, HORN, PINEL, BATEMAN, and WILLAN. The co-existence of cow-pox and measles, and of hooping-cough and measles, is not infrequent.

59. *f.* The morbillous miasm, having produced its specific effects, leaves the frame exempted from a second attack. But this exemption is not universal. It is so general, however, as to induce such experienced observers as WILLAN and ROSENSTEIN to believe in its universality; whilst the exceptions to this law are so rare as to be observed only by few, and, probably, in certain epidemics only. Second attacks have been recorded by BURSERIUS, ROBERDIEN, HOME, BAILLIE, WEBSTER, and observed also by the author. It has been fully ascertained that the spurious disease, which has been termed "*Morbilli sine catarrho*," does not protect the system from true measles; but it has not been shown that those cases of morbillous fever, unattended by eruption (§ 31.), admit of a subsequent attack.

60. That the morbillous miasm contaminates the circulating fluids, and even the soft solids, and so infects them as to enable them to propagate the disease, is shown not only by the experiments alluded to above (§ 56.), wherein the fluids communicated the malady, but also by the fact of infants having been born with the morbillous eruption when their mothers have been the subjects of the disease at the period of parturition.

61. As the measles have been said to have appeared at the same time, and in the same country, they have been presumed to have had a similar local origin. But the measles, Dr. WILLIAMS observes, now prevails all over the world, occurs at all seasons, and frequently without our being able to trace them to any contagious source; so that we may infer that the morbillous poison is generally diffused through the atmosphere, and at all times of the year. But such can hardly be the case; for, as measles are an *infectious* as well as a *contagious* disease (see art. INFECTION, § 4.), and are diffused chiefly by fomites, as the fomites retain the morbillous poison for a long period in temperate or cold climates, and as the susceptibility to infection by it is extremely great, in the young more particularly, whilst the period which elapses between the first impression of the cause and the development of the disease is long, so it seems the more probable that the extension of the poison will be rapid, wide, and traced with great difficulty, or not traceable at all, without the general diffusion of it in the atmosphere supposed by Dr. WILLIAMS.

62. A few years ago, the measles were introduced into the Cape of Good Hope, where they had not appeared for about thirty years, by a vessel from Europe, in which several cases occurred during the voyage. The disease spread, and with its diffusion, the difficulty of tracing the sources of infection in individual cases encreased; all being susceptible of infection under thirty or thirty-one years of age. The heat and dryness of the climate during several months of the year being unfavourable to infection, the malady soon disappeared after those susceptible of it had become infected, few remaining liable to it but infants born after its introduction into the colony.

63. *g.* As to the *origin* of the disease, nothing more credible than supposition can be adduced. KIRCHER, LINNÆUS, and NYANDER ascribed this disease, as well as small-pox, plague, &c., to swarms of minute insects in the atmosphere. The probability of its origin in a miasm proceeding from numbers of persons breathing a confined air with their cattle, has been hinted at by HILDENBRAND. "In diversis ac dissitis villis, præsertim in vaccarum stabulis, in quibus plures sæpe familiæ unacum prolibus unitæ totam ferme transigunt brumam, morbillosum emicare vidimus contagium eousque vigens, donec plurimis individuis infectis, talique pacto hominum dispositione extincta, exhausto igitur quasi solo, in quo radices figere posset, in lethargi speciem cadat, data recenti occasione denuo ad activam vitam surrecturum. Nostra quoque sub zona huncce fomitem contagiosum in morbis catarrhalibus gravioribus, opitulante constitutione annua, vel specifica plurium hominum et animalium cohabitantium mephite, primitus oriri posse, conjectura quidem foret, nobis omnino non improbabilis, quam tamen ob defectum observationum defendere nondum auderemus." (*Instit. Pract. Med.* t. iv. p. 359.)

64. *h.* The *predisposing causes* of measles are chiefly the epoch of childhood, or any period antecedent to puberty. But a susceptibility of, or predisposition to, the disease, exists in all persons who have not been infected by it; probably, however, decreasing with the progress of age after the period of puberty. The influence of *season* is not strikingly manifested, as the disease may be epidemic in any season in temperate climates. According to the Report of the Registrar-general, the deaths from measles in the metropolis were 173 in the first, 96 in the second, 94 in the third, and 251 in the fourth three months of 1838; — 251 in the first, 623 in the second, 782 in the third, and 380 in the fourth three months of 1839; — 194 in the first, 275 in the second, 308 in the third, and 355 in the fourth three months of 1840; — 158 in the first, and 147 in the second three months of 1841.

65. Although the prevalence of measles appears to be but little dependent on season, still some influence may be imputed to it — an influence much insisted upon by SYDENHAM and others, who considered that the disease was usually most prevalent during the first half of the year. More influence is evidently owing to certain epidemic constitutions of the air, which are manifested chiefly by their effects, than to either season or weather; for, at all seasons, and in all kinds of weather, merely occasional cases of the disease

may present themselves; and these only may appear for a long period; when suddenly the disease may assume an epidemic form, without any circumstance in the weather or season being observed that can account for the change. Generally, however, measles are epidemic, when catarrhal affections are also prevalent; and a frequent connection has been remarked between epidemic hooping cough and this disease.

66. VII. TREATMENT. — The scope and object of the treatment of measles are, — 1st, to moderate and preserve the vital actions; — 2d, to subdue or soothe the more troublesome symptoms; — 3d, to aid and direct critical efforts, and prevent unfavourable determinations or metastases of morbid action; — and, 4th, to prevent or remove the sequelæ or morbid effects of the disease. These *intentions* nearly agree with those mentioned by HILDENBRAND. The more general *indication*, however, *to alleviate unfavourable symptoms as they arise*, comprises the whole of the foregoing.

67. *a.* During the eruptive stage, it is chiefly necessary, as Dr. G. BURROWS well observes, to pay attention to the regular action of the bowels, to confine the patient to bed, in a moderate temperature, and to a light farinaceous diet, with cooling and demulcent drinks. The heat of skin preceding the appearance of the eruption is best treated by moderate doses of the liquor ammoniæ acetatis, and spiritus ætheris nitrici in camphor mixture: the external application of cold at this period is not unattended by risk, especially of encreasing the bronchial and pulmonary symptoms.

68. In mild cases no further means than the above are requisite throughout their course. WILLAN, however, prescribed an emetic on the second or third evening, conceiving that it alleviated the violence of the catarrhal symptoms, and tended to prevent the diarrhœa which usually succeeds the disease; and Dr. FOTHERGILL administered repeatedly antimonial emetics. This latter plan, however, requires caution, and is suited only to cases in which the tracheal or the bronchial and pulmonary affection is considerable, and the accumulation of mucus and muco-albuminous matters in the bronchi is great and expectorated with difficulty. Dr. WILLAN remarks, that he has not observed any considerable effect from antimonials, or other diaphoretics during the eruption; that bathing the feet every evening seems more beneficial; and that emulsions and mucilages afford little or no relief to the cough and difficulty of breathing.

69. *b.* In the *inflammatory state* of the disease, in which the bronchial membrane, and even the substance of the lungs, the conjunctiva, &c. are the seat of congestive inflammatory action, *blood-letting*, general or local, or even both, is requisite; but, unless symptoms of inflammatory action present themselves, this measure should be reserved. SYDENHAM directs blood-letting when the fever is violent, with difficulty of breathing, and other pulmonic symptoms. CULLEN remarks that, as the symptoms of pneumonic inflammation seldom come on during the eruptive fever, and as this fever is sometimes violent immediately before the eruption, though a sufficiently mild disease be to follow, so bleeding is seldom necessary during the eruptive fever, and may often be reserved for periods of greater danger. WILLAN and BATEMAN are adverse to bleeding early in the disease, because oppression of breathing, with labouring pulse on the first or second days of the eruption, usually disappear in the course of twenty-four hours. But when the eruption has disappeared, and the cough, pain of the chest, and difficulty of breathing become severe, bleeding and cupping become necessary. When, however, the symptoms are decidedly inflammatory early in the disease, bleeding ought not to be deferred, for it may be too late if it be put off until the eruption has disappeared. As to the quantity of blood which may be taken, no directions ought to be given. It always should be regulated by the character of the epidemic, and the states of vital power and re-action. Patients in large cities and manufacturing towns cannot bear losses of blood equally with the well-fed, and those breathing a pure or country air; nor is even the inflammatory state of this disease equally tolerant of vascular depletion with primary or pure pneumonia or bronchitis. As in all diseases which are produced by an infectious or contagious miasm, so in this, although in a somewhat less degree than in some, bloodletting should be practised with caution; and even the inflammatory complications they may present or induce are less under the control of, and are less benefited by, this treatment, than inflammations which are not thus produced, and not so allied.

70. The opinions of writers as to the propriety of bloodletting in measles have been influenced chiefly by the characters of the epidemics which came under their observation; for, whilst most writers of reputation admit the propriety of this measure in the inflammatory state, they equally condemn it when no such condition exists. HAMILTON, MURRAY, and others did not have recourse to it, probably in consequence of the non-inflammatory nature of the epidemics they had to treat; whilst MORTON, MEAD, HEBERDEN, HORN, FERGUSON, ARMSTRONG, and others considered that bleeding should form a part of the treatment of the disease, manifestly owing to the inflammatory form of the epidemics which they observed. HEBERDEN advised it whenever the breathing is oppressed. MEAD states that "about forty years ago the measles raged with great violence in the city, and were more fatal than even the small-pox;" and that he always opened a vein in the beginning of the distemper, or as soon as he could when called in late, "because the disease always brings with it a peripneumony." MORTON deferred bloodletting until after the eruption is completed, the malady being, in his opinion, most inflammatory at that time.

71. Every observing physician must be convinced that in London especially, and in most very large towns, bleeding ought not to be generally adopted in the treatment of measles, although it may be practised with greater impunity in them than in other infectious maladies; and that it should not be neglected in the pneumonic and other inflammatory states of the disease noticed above (§ 42.). Dr. WILLIAMS justly observes, that we should be content with moderating the symptoms by it; for, as the disease has a specific course to run, a sudden cure ought not to be expected. The bleeding also should be more moderate during the eruption than after its subsidence; for a mitigation of the symptoms may be expected when it disappears. The presence of

menstruation should not deter from bloodletting when clearly required, although it may indicate a more moderate recourse to it.

72. In aid of vascular depletion, when clearly indicated, and even independently of this agent, when the powers of life are too low to admit of it, *calomel* and *opium* with *antimony*, if the *sthenic* condition prevail, or with *camphor* or *ammonia*, if the *asthenic* state is prominent, should be prescribed; and the pulmonic complication otherwise treated conformably with the principles developed in the article on inflammations of the Bronchi and Lungs (see these articles).

73. In all cases, particularly when the eruption has disappeared, of visceral affection, or of the prominent affection of any important organ, the application of *rubefacient embrocations*, *blisters*, &c., in aid of such other means as the characters of individual cases suggest, will prove of service. When the eruption is repelled by exposure to cold, the treatment should depend upon the frequency and strength of the pulse, and the organ chiefly affected; but in these cases, a strenuous recourse to warm diaphoretics, to the warm bath, to which salt and mustard may be added, and to active rubefacients, blisters, and other external derivatives, is more especially indicated.

74. *c.* In the *gastric form* of measles, and particularly if associated with hooping-cough, an ipecacuanha emetic early in the disease, or even repeated in the course of it, is often of service. In these, calomel and the milder forms of mercury, aided by aperients, are generally required to evacuate accumulated biliary and intestinal secretions. If, in this state of the distemper, the eruption be imperfectly evolved, or if it retrocede prematurely or suddenly, the warmer diaphoretics, external rubefacients (§ 73.), &c. should be prescribed.

75. *d.* In the *nervous state* of the disease, particularly when associated with convulsive or spasmodic symptoms, with singultus, stupor, startings of the tendons, &c., cupping on the nape, or leeches applied behind the ears, when the patient is plethoric, or signs of cerebral plethora are present, free evacuations of the bowels, and camphor, with small doses of opium, or with henbane, are generally of great benefit. When the eruption is either delayed or imperfectly evolved in this variety, ammonia, capsicum, æther, various aromatic spirits, and other diffusive stimulants may be exhibited; and, aided by warm mustard pediluvia, mustard poultices, terebinthinate embrocations, and blisters applied only for a few hours. In young children, however, opium and blisters ought to be employed with great caution.

76. *e.* The *septic*, *putrid*, or *malignant form* of measles requires the exhibition of camphor, ammonia, cinchona, or quinine, the alkaline carbonates, capsicum, the chlorate of potash, the chlorides, creasote, and other medicines of the same kind, variously combined, according to the features of the case. In it, a free use of wine, and small doses of opium, frequently repeated and conjoined with aromatics, stimulants, &c., are generally of use. It has been supposed that local bleedings may be of service early in this form of the disease; but, however early they may be employed, they are of doubtful efficacy. In most respects, the treatment should be directed as recommended for *adynamic* or *putrid* Fever (§ 559. *et seq.*).—In this variety, the most beneficial external applications are warm flannels moistened with spirits of turpentine and cajuput oil. Blisters are attended with risk.

77. *f.* When *diarrhœa* follows the disappearance of the eruption, diaphoretics with gentle anodynes, as with syrup of poppies, or the paregoric elixir; the warm bath, rubefacient embrocations on the abdomen, and mucilaginous or farinaceous articles of diet, are most appropriate. If the diarrhœa be slight, and the evacuations fæculent, small doses of hydrarg. cum creta, of ipecacuanha, rhubarb and magnesia, are most beneficial, and should be occasionally given, even when it is found requisite to restrain the action of the bowels by the means just mentioned.

78. *g.* If *pneumonic* or *bronchitic symptoms* follow the disease, the means advised for similar states of pneumonia or bronchitis, according to the strength of the patient, and to the severity of such consecutive disease, must be employed. In most of these cases, external derivatives, and the warm terebinthinate embrocation, are very serviceable, particularly after bloodletting has been sufficiently but cautiously practised.

79. *h.* During the course of the disease, a low *diet* should be enjoined; and even in the mildest cases small quantities only of farinaceous food, or rice, arrow-root, &c., should be allowed. *Fluids* should be taken at nearly a tepid temperature. Whey, barley-water, and other demulcent drinks may be given. In the adynamic and malignant states of the disease, Seltzer water, soda water, with sherry negus, &c., may be allowed. The chamber should be of a moderate temperature, and be kept free from currents of air, or changes from heat to cold.

80. *i.* No fully ascertained means of *preventing* the disease have yet been demonstrated. Inoculation does not promise any advantages. M. Tortual has recommended the internal use of sulphur as a prophylactic; but its influence has not yet been satisfactorily shown.

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MEDIASTINUM — *Inflammation of*. — *Mediastinitis*, Hildenbrand. *Pleuritis Mediastini*, Kerstens.

Classif. — I. Class. III. Order (*Author*).

1. Defin. — *Obtuse pain extending behind the sternum to between the shoulders, with constriction, internal heat, anxiety, dry short cough, and inflammatory fever.*

2. Inflammation of the mediastinum has been distinguished from a similar disease of the rest of the pleura by several authors. When this duplicature of the pleura is inflamed — an occurrence not frequently observed, the diagnosis is extremely difficult. The Arabian physician, Avenzoar, is the first who attempted a history of this disease. According to Friend, he had been afflicted with it. After him Salius Diversus (*De Febri Pest. et Curat. part. Morb.* c. vi. p. 247.) has taken particular notice of it, and recorded several cases in which he observed it. Morgagni, Trombell, Sauvages, Kerstens, Flajani, and Hildenbrand have also contributed much to our knowledge of the disease and the effects it produces.

3. i. Symptoms. — Obtuse and deep-seated pain behind the sternum, and extending to the upper part of the back, between the shoulders, and declining towards the ensiform cartilage. A sense of constriction and internal heat in the same situation; great inquietude and anxiety, thirst, dry cough, or with scanty coloured expectoration, and inflammatory fever. In addition to these, Salius Diversus enumerates short and frequent inspiration, not materially increasing the pain as in pleurisy, unless on a forced respiration; hard frequent pulse; and decubitus on the back.

4. When the disease is complicated with *pleurisy*, which is often the case, or with *pneumonia*, the disease may not be recognised even after attentive examination. If the inflammation extend, or be coëtaneous with *pericarditis* or *carditis*, as post mortem examinations sometimes show (Portal, *Anat. Méd.* t. v. p. 28.), palpitations of the heart, syncope, or leipothymia, quick, tumultuous, irregular pulse, in addition to the foregoing symptoms, will frequently indicate the nature of the complication. Mediastinitis occasionally supervenes in the progress of fevers, and even goes on to suppuration without being detected, until upon post mortem inspection.

5. ii. The Causes of mediastinitis are chiefly external injuries; fracture of the sternum; wounds; the suppression of discharges; the repulsion of chronic eruptions; and the usual causes of *pleuritis* or *pneumonia*. (See arts. Lungs, § 80. *et seq.*, and Pleura.)

6. iii. The Prognosis in mediastinitis should be very guarded. The disease seems more disposed than pneumonia to terminate in abscess; and, even when its violence seems subdued, an unfavourable issue may take place. Vander Wiel (*Obs.* 19. *cent.* ii.) records a case which suddenly terminated fatally on the eighth day, the symptoms having been apparently diminished for a short time before.

7. iv. The Terminations of mediastinitis are, 1st, in resolution; — 2d, in abscess; — 3d, in thickening and induration; — and, 4th, in death — (*a.*) *Resolution* of the inflammation takes place with similar phenomena to those I have stated in *pleuritis* and *pneumonia*.—*b. Death* is generally occasioned by the extension of the disease to the adjoining viscera, and the effects thereby produced upon the functions and organs of circulation and respiration. It may also result from the formation of abscess, or from the consequences of chronic inflammatory action continuing after the more acute symptoms have disappeared. Of these I proceed to take some notice.

8. *c.* Abscess *in the mediastinum* has received the notice of physicians since the time of Galen, who mentions a case of it from a wound. J. P. Petit records an instance of it from a blow on the sternum. Van Swieten details another consequent upon primary inflammation of this part; and numerous other cases are furnished by Balck, Columbus, Linguet, Vicq d'Azyr, David, Blancard, De Fabrici, Portal, &c. The abscess is generally seated in the cellular tissue, connecting the laminæ of pleura forming this partition, and is the consequence of inflammation arising either spontaneously or from injuries, and, according to the observations of the above authors, is often connected with the scrofulous diathesis and the venereal taint. It may also form in the course of idiopathic fevers.

9. *d.* The Symptoms indicating abscess in the *anterior mediastinum* are, after those which I have mentioned (§ 3.) as characterising inflammation, the sensation of cold in the course of the spine, with chills or rigors, followed by flushes of heat or perspirations; deep-seated, heavy, and pulsating pain behind the sternum, and extending between the shoulders; oppression, palpitations, syncope, or leipothymia; slow or hectic fever, with

irregular chills or rigors; dry short cough, difficult, wheezing respiration, inability to lie down, &c., and all the phenomena characterising the presence of purulent formations. If the powers of the constitution continue sufficiently long, the purulent collection endeavours to find its way externally. In some cases it becomes effused into the abdomen, through the anterior triangular space over the centre of the diaphragm. Occasionally it partially detaches the pleura from the sternum and the costal cartilages, and appears externally at one side of the sternum, forming a round, soft, fluctuating tumour. In the case of a boy, aged about six years, who was attended by the late Mr. Earle and myself, the abscess made its way externally at the right side of the lower end of the sternum, and recovery took place. In other cases the matter, after being long pent up beneath the sternum, destroys and perforates a portion of this bone. In some cases of abscess in this situation the preceding inflammation commences in the sternum itself, or its internal surface, and the caries of it proceeds pari passu with the formation of matter beneath it. In cases of this description, the extent to which the destruction of bone takes place and the external wound are much greater, so much so in some instances that the pericardium has been exposed, the heart appearing through it. The immortal Harvey showed a case of this description to Charles II.; and a similar case was observed by Galen.

10. Abscess in the mediastinum is always a most dangerous disease, owing both to its proximity to vital organs, whose functions it impedes, and to the difficulty of ascertaining its existence previously to the appearance of the most serious symptoms. The Prognostic should therefore be given accordingly. The cause in which it originated, the state of the vital energies of the frame, and the existence of scrofulous or venereal taint, will also influence the diagnosis.

11. v. Treatment. — *Mediastinitis*, before it has gone on to suppuration, or to any other unfavourable termination, should be *treated* as fully stated in respect of *pneumonia* and *pleuritis*. (See art. Lungs, § 91. *et seq.*, and Pleura.)

12. When we have reason to suspect the formation of *abscess*, the occasional application of a few leeches, and persistence in the anti-phlogistic treatment and regimen, particularly in aperients and diuretics, will be serviceable as long as the inflammatory symptoms continue, and the pulse retains much force or tone. In an opposite state of the system, when the pulse is very weak, small, quick, and compressible, and the energies of the system seem insufficient to resist the extension of local mischief, and contamination of the frame, then vegetable tonics and bitters, and the mineral acids, alone or combined with tonics, are indicated. When the abscess points externally it should be opened with a lancet, its contents partially removed, the aperture carefully closed so as to exclude the air, and the operation repeated according to circumstances; employing at the same time the medical treatment just indicated, viz. small depletions, &c., when action is increased; and when the vital energies require support, digestible nourishment and the tonic means now stated, and the various remedies advised in the article Abscess (§ 62. *et seq.*).

13. When the purulent matter is confined below the sternum, producing slow destruction of the surrounding parts, with caries of this bone, the majority of authors quoted above recommend the sternum to be trephined, and an external outlet to be thus given to the matter. Juncker and Platner consider it less dangerous than a similar operation performed on the cranium. Dionis adduces a case in which death followed the performance of this operation; but this result was probably not caused by it, or even might have been averted by an earlier recourse to it. Petit, Colon, and Lamartiniere consider it the only resource in cases of this description, and one which will occasionally be successful. Lassus states, in his work on surgical pathology, that he treated a physician who had a fistulous opening above the zyphoid cartilage, from an abscess in the anterior mediastinum, for fifteen months; its enlargement had been recommended by some surgeons. This was prevented, and the patient recovered perfectly a few months afterwards.

14. *Abscess* may also form in the *posterior mediastinum*, though less frequently than in the anterior. In this situation it may be the result of inflammation of the vertebræ, or intervertebral substance, or of caries of the former, or it may originally take place in the connecting cellular tissue, and produce caries of the vertebræ from pressure, constant dysphagia, and disorder of the heart. When occurring in the posterior mediastinum, it may have been *caused* by violent exertion, rheumatism affecting the fibrous structure of the vertebræ, syphilis, scrofula, &c. The symptoms produced are generally more severe, and the result more uniformly fatal, than when abscess forms behind the sternum. Death often takes place suddenly, and then, and frequently not until then, is the cause made manifest.

15. vi. Thickening and Induration of the laminæ of the mediastinum is generally the result of chronic inflammatory action. Sometimes these changes are so considerable as to approach to the state of cartilage, in which state M. Portal found them in a case of hydrothorax, consequent upon bronchitis.

16. vii. Other organic Changes in the mediastinum are occasionally met with, especially scrofulous tumours; enlargement of the thymus gland; lardaceous and albuminous formations; collections of fat and fatty tumours; effusions of blood, and serous infiltrations. Instances of these are to be found in the writings of Bonet, Morgagni, Lieutand, Riviere, Corvisart, Otto, &c. I saw an instance in which scrofulous or tubercular depositions in, and enlargement of, the lymphatic glands lodged in the mediastinum occasioned fatal pressure on the trachea, and large blood-vessels. Portal records a case in which death was occasioned by a steatomatous tumour formed in the posterior mediastinum, and pressing on the large vessels and nerves.

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MELÆNA. — SYN. *Μέλαινα νοῦσος*, Hippocrates. *Morbus niger*; *Hæmatemesis atra*; *Hepatorrhœa*; *Fluxus spleneticus*; Auct. var. *Secessus niger*, Hoffmann. *Melæna splenetica*, Sauvages. *Melænorrhagia*, Swediaur. *Maladie noire*, *Ictère noire*, Fr. *Schwartze-krankheit*, *Schwartze-galle*, *Schwartze-blutfluss*, Germ. *Melena*, Ital.

CLASSIF. — IV. CLASS. I. ORDER (*Author*).

1. DEFIN. — *Discharges from the bowels, or from the stomach, or both by stool and by the mouth, of a black, or nearly black matter, consequent upon visceral or constitutional disease.*

2. By HIPPOCRATES and the ancients generally the term *Melæna* was applied to the vomiting of black fluids; but, since the appearance of the writings of HOFFMANN and SAUVAGES it has been extended, and chiefly confined to the discharge of a black matter from the bowels. In the above definition I have extended its acceptation, so as to embrace the meaning attached to it by both the ancients and moderns.

3. The black colour of the discharges has been variously explained by writers. By the ancients it was imputed very generally to the altered colour of the bile; and by the moderns, as generally, to the admixture of blood with the secretions and fæcal matters in the bowels. Hence Dr. M. GOOD divided Melæna into *M. Cholæa*, and *M. Cruenta*. When treating of the latter state of this consecutive malady, in the article HÆMORRHAGE, INTESTINAL (§ 190. *et seq.*), I pointed out a *third* source or *variety*, namely, in morbid secretion from the mucous follicles. Dr. GRAVES has illustrated and confirmed this view in his excellent clinical lectures. He remarks that a large man, accustomed to eat and drink largely, passed by stool and vomited enormous quantities of black fluid; and experienced eructations of sulphuretted hydrogen. His tongue was as black as ink. Dr. GRAVES states, that he ascertained by numerous experiments this black fluid to be a secretion from the mucous membrane of the bowels.

4. I. FORMS. — From what has just now been stated it will appear obvious that *Melæna*, in all its forms — 1st, as resulting from the exudation of blood from the digestive mucous surface, or the admixture of it in any way with the contents of the digestive canal; 2d, as proceeding from a thick, viscid, and black state of the bile; or, 3d, as owing to a morbid secretion from the digestive mucous surface and glandular apparatus — is entirely a symptom, or consecutive malady; that it altogether is a contingent phenomenon upon visceral or constitutional disorder, or structural disease.

5. i. The *first, or sanguineous variety of Melæna* I have treated of, at length, in that part of the article HÆMORRHAGE already referred to. It is not, therefore, necessary to discuss this part of the subject further at this place. I may, however, add, that this is the most common form of Melæna; and that a black matter is not infrequently discharged by vomiting and stool in malignant diseases — both those of a local character, as carcinoma of the stomach, and those of a febrile and pestilential nature, as yellow fever (see art. PESTILENCES and STOMACH). But, although this matter is principally owing to an exudation of blood, either partially altered previously to its extravasation, or chiefly or entirely changed subsequently to its escape from the vessels, by admixture with other matters in the digestive canal; still there is reason to believe that the states of the bile and other secretions in those malignant and constitutional maladies, contributes somewhat to the black or very dark hue of these discharges. In some of the many cases of malignant puerperal fever I have seen, the fluids discharged by vomiting and by stool have presented the blackish hue of melæna; and, after the best attention I could bestow upon the subject, I have considered this hue to be owing to the state of the secretions chiefly; in some instances, however, partly to the admixture of a bloody exudation.

6. ii. The *second source of melæna, or altered bile*, has been also attended to in the articles GALL BLADDER and DUCTS and HÆMORRHAGE FROM THE INTESTINES (§§ 193, 194.), and the means of distinguishing between melæna from this and other sources have been there pointed out. In this variety the stools, and sometimes also the matters vomited, present a greenish-black hue, the former being of the consistence and colour of tar or treacle. Two females, the one about, the other above middle age, complained of attacks similar to spasmodic asthma associated with chronic disorder of the liver, and paroxysms resembling the passing of gall-stones or spasm of the gall-ducts, the countenance being sallow and the bowels confined. I prescribed the strenuous exhibition of chologogue purgatives, which brought away pitchy evacuations that assumed a greenish hue when diluted with water, and entirely removed the attacks.

7. iii. The *third source, or the secretion of a blackish substance* from the internal surface of the intestines, is probably of much less frequent occurrence than the foregoing. It may arise in a similar state of the system to that which disposes to the production of *melanosis*; the vital powers, and the state of the circulation and of the blood in the capillaries of the digestive mucous surface and glands, not admitting of the due combination of the carbon of the blood with oxygen, so as to form carbonic acid to be discharged by the lungs; but allowing the carbon to accumulate, so as to exude from the surfaces of secreting and yielding membranes.

8. II. DIAGNOSIS. — As HOFFMANN has observed, melæna is to be especially distinguished by the tormina, spasms, and pain preceding and accompanying the black evacuations, and by the danger in which the patient is placed — a danger frequently becoming more imminent with the continuance of this appearance of the discharges. When, however, it depends upon the excretion of long pent up and altered bile, a rapid recovery often follows the evacuation, as in the cases just noticed, and in others that I have seen. In one of these, the patient, who is still alive, and to whom I was first called about twelve years ago, has had frequent attacks of great severity, the copious, black, treacle-like stools being always followed by recovery; these stools presenting first a dark-greenish, and afterwards a yellowish-green hue, when diluted with water. If the black discharge be blood altered by the secretions, &c., it

usually presents a reddish hue when diluted with water, or with water containing a little carbonate of soda; and when this kind of discharge is put in a small linen bag, and plunged in warm water, the linen is stained of a reddish colour; but when the black fluid, which is excreted from the *third* source mentioned above (§ 7.) is thus treated, the colour is not materially altered. It should, however, be recollected, that various articles taken into the stomach occasion a black appearance of the evacuations, as black puddings, the preparations of iron, and the acetate of lead when it meets with sulphuretted hydrogen gas, &c.; that others give them a red colour, as logwood, bilberries; and some a blackish green hue, as spinach.

9. III. Prognosis. — Melæna is generally a dangerous symptom, unless when it proceeds from the passage of blood in small quantity, or in a half-digested state into the intestinal canal, in some one of the less important cases of hæmorrhage. It may attend epistaxis and hæmatemesis from suppressed menstruation, and then it cannot be considered a dangerous phenomenon; but, in most other cases, and even when it proceeds from biliary accumulations and morbid secretions, it may be viewed as a very unfavourable occurrence. The prognosis, however, should depend upon the particular source of this change, and upon the various pathological conditions, especially the state of vital power, existing in connection with it. When it occurs in the course of low, adynamic, or putrid fevers, or of malignant diseases, it indicates a fatal result.

10. IV. Treatment. — *a.* When the black state of the discharges proceed from *hæmorrhage*, then the treatment recommended for *hæmorrhages from the stomach and intestines* (§§ 142. 184. *et seq.*) is the most appropriate, more particularly the exhibition of spirits of turpentine, as then advised. In addition, however, to the usual remedies employed to restrain the exudation of blood, means are required to support the powers of life; and frequently such restoratives should be of the most energetic kind, as brandy, port-wine, the hot spices, &c.

11. *b.* When the black matter seems to consist chiefly of altered bile, or of morbid intestinal secretions, chologogue purgatives, with stimulants, antispasmodics, restoratives, &c., are then generally required; but the treatment must necessarily much depend upon the previous history of the case, and the existing pathological states. Melæna, from these sources, is a comparative rare contingency upon prolonged disorders or complicated diseases, and should be treated according to the several forms which these assume. (*See more especially on this subject the article* Hæmorrhage from the Intestines, § 200. *et seq.*)

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MELANCHOLIA. — See Insanity (§§ 106. *et seq.*).

MELANOSIS. — Syn. *Melanosis* (*μελάνωσις*, from *μέλας*, black, and *νόσος*, disease). *Melanotic formations; Melanoma*, Carswell. *Fungus Melanodes*, Wardrop. *Degenerescence noire*, Breschet. *Melanose, Cancer mélane*, Fr. *Das Schwartzwerden, der Eingeweide*, Germ. *Melanotic tumours.*

Classif. — IV. Class. II. Order (*Author*).

1. Defin. — *A morbid production of a black or blackish-brown colour, dissimilar from other structures, whether healthy or diseased, occurring in various forms in different parts of the body.*

2. This was described first by M. Laennec (*Bulletin de la Soc. de l'Ecole de Méd.* 1808), Dupuytren, and Bayle, as a distinct disease. It seems, however, to have been previously noticed by Mr. Wardrop, but considered by him as a species of fungus hæmatodes. The division of the several forms of melanosis suggested by Laennec has been very generally adopted; but the results of more recent researches have suggested different, or at least modified, arrangements of these forms. Melanotic formations, Dr. Carswell remarks, may take place in various and different parts of the body; may present much variety of form; and may owe their production to different agents. But, whilst I admit the first and second of these propositions, I dispute the third; inasmuch as it is not applicable to true melanosis, and applies only to that comprehensive classification which comprises, as forms of melanosis, those alterations in the colour and texture of parts produced by the introduction of carbonaceous matter into the system, by the action of chemical agents, and by the stagnation of the blood. These latter alterations have been denominated *spurious melanosis*, and will be briefly noticed in the sequel.

3. I. True Melanosis. — i. Its Seat. — *a.* The *cellular* and *adipose tissues* are the most frequent seat of this disease; and, in them, it occurs in the largest masses and most circumscribed forms. Owing to the distribution or extension of these tissues, it spreads or extends itself, as in the course of bloodvessels, &c. — *b.* When melanosis is found in the *skin*, it is most commonly an extension only of that existing in the subjacent cellular or adipose tissues, and is very rarely a primary alteration of the skin. — *c.* Dr. Carswell believes that this change very rarely occurs in *mucous membranes*, those cases in which it seems to exist in these being really instances of it only in the subjacent cellular tissue. — *d. Arterial, venous, and muscular tissues*; *serous and synovial membranes*; *aponeuroses, tendons, and cartilage*, do not contain melanotic matter as a primary alteration, although they present the dark brown or black colour, arising from contiguity with, or from the imbibition, infiltration, or exudation of, this matter when in a state of fluidity, or from other causes about to be noticed. — *e.* The spongy *bones*, as the sternum, are more frequently affected than the other bones. — *f.* The *liver* is, of all the compound structures, the most frequently the seat of melanosis, ranking in this respect next to the cellular and adipose tissues. — *g.* Melanosis occurs much less frequently in the *lungs* than in the liver, nor does it acquire the same bulk or extent as in that organ. — *h.* It

has been very rarely seen in the *spleen* and *brain*. Instances, however, have been met with by LOBSTEIN and HOOPER, of its occurrence in the latter. — *i.* Melanosis has been occasionally observed in the *eye*, in the *pancreas* and *lymphatic glands*, in the *thyroid* and *parotid glands*, in the *kidneys*, in the *testes*, in the *ovaries*, *uterus*, and *mammæ*. In all these it may exist either alone, or associated with other morbid products. — *k.* Melanotic matter has been detected in the *blood*. Dr. CARSWELL states, that it has chiefly been in the minute veins of the liver that melanosis has been found; the vessels containing this matter appearing like black lines or striæ, or dots, and sometimes in a pencillated form. — *l.* Melanotic fluid or matter is very rarely found on the surfaces of cavities natural or accidental, unless as an exudation from parts underneath, or from the perforation of melanotic tumours.

4. Melanosis is sometimes found *associated with other morbid productions*. BRESCHET, ANDRAL, and LOBSTEIN have met with it in the false membranes formed on serous surfaces; and the last-named pathologist has seen it accompanying ossific deposits in the coats of arteries. It is occasionally found associated with scirrhus, carcinoma, and fungo-hæmatoid formations, not only in the same organ, but even in the same diseased mass. This combination of these morbid productions has induced some writers to consider melanosis as a species of cancer; but the incorrectness of this opinion will appear in the sequel.

5. ii. THE FORMS OF TRUE MELANOSIS. — These are altogether *four*: — 1. the punctiform; — 2. the tuberiform; — 3. the stratiform; and, 4. the liquiform. — *A.* The *punctiform melanosis* is that in which the black colouring matter appears in minute dots or points, grouped together, or scattered over a considerable extent of surface. This form agrees with that which LAENNEC denominated the *infiltrated*. Dr. CARSWELL states, that this is most frequently met with in the liver, the cut surface of which appears as if dusted with soot or charcoal. Under a lens the black points appear stellated or pencillated, and in some instances are distinctly seen to originate in the ramiform expansion of a minute vein filled with black matter. In other instances, the black substance appears to be deposited in the molecular structure of the organ. This form is not met with in the brain, nor in the cellular, adipose, serous, and fibrous tissues.

6. *B. Tuberiform melanosis* is by far the most common form of the disease. It varies in *size*, from that of a pin's head to that of an orange in man, or to that of a melon in the horse. The great size which these tumours sometimes assume is owing to the agglomeration of a number of smaller tumours, the size varying with the number and size of the constituents. The *form* of these tumours is spheroidal or ovoid when single, and generally lobulated when aggregated. The single tumour occurs most frequently in compound tissues and organs; the aggregated in the cellular and adipose tissues. Both the single and aggregated melanotic tumour may be either *encysted* or *non-encysted*. In the latter, the black matter is in immediate contact with the tissue of the part. In the former, the cyst is formed of condensed cellular tissue, stretched out around the contained matter, and forming a thin transparent envelope to it. Encysted melanotic tumours do not occur in a very perfect or distinct state in any of the compound tissues or organs; but chiefly in cellular and adipose tissues, owing to the nature of these tissues. The melanoid tumours found occasionally on the surface of the peritoneum and pleura, and there even assuming a pedunculated or polypous appearance, seem to be developed, in most instances, under the serous membrane, carrying the membrane before and around them, it thus constituting a thin cyst or envelope; yet, in rare instances, the black matter has been found external to, or upon, the free serous surface, enclosed in a loose, spongy tissue, or serous covering of considerable tenacity, but of great tenuity.

7. *C. Stratiform melanosis* occurs only in serous membranes. The black matter either may only paint or stain the serous surface, or it may form an almost distinct layer on this surface. In the latter case, the consistence of the black matter is that of very firm jelly, or somewhat greater. It seems to be deposited in a very fine, transparent, soft, spongy tissue, like that enclosing the melanoid matter in the serous melanotic tumours just described. This form of melanosis is not often met with in man; but to a much greater extent in the horse.

8. *D. Liquiform melanosis* is chiefly formed in natural or morbid cavities. It is occasionally secreted or exuded in these situations, or effused during the softening process of melanotic tumours. It is very rarely met with in man. It has been observed in the serous cysts formed in the ovaries, and the capsules of the ova which have escaped from these organs.

9. To these four forms of melanosis, which has been minutely described by Dr. CARSWELL, a fifth has been added by Dr. NOAK, which he denominates *melanosis aperta*, vel *ulcerosa*; and Dr. SAVENKO has proposed another, which he describes as *carcinomatous*. The former is more frequently met with in the horse than in man, and is merely a consequence of certain changes produced in the tissues by the matter deposited, that will be hereafter noticed; the latter is only the association of carcinoma with melanosis.

10. *E.* One or more of these forms may coexist, and either may exist singly. The tuberiform deposit is the most common and conspicuous of all the forms melanosis assumes. The disease is never confined to one tissue or organ only; but is found to pervade a greater or less number of these either simultaneously or successively. It may be almost equally extensive in all parts which it invades, or it may be abundant in one situation and scanty in another. It may be even so extensive as to render the natural structure of the part imperceptible.

11. iii. THE ANATOMICAL RELATIONS OF MELANOSIS. — The texture and form of the part in which the melanotic matter is deposited determine in a great measure the *consistence* which this deposit assumes. There is every reason to infer, that the black matter is deposited in a more or less fluid state, particularly in cellular and adipose tissues; and that it acquires additional consistency by the absorption or imbibition of its more liquid parts. Thus deposited in a fluid state in the areolæ of the tissue, it will necessarily assume various forms according to the nature of the tissue or compound structure, to the rapidity with which

the deposit takes place, and to the abundance of the matter deposited. Viewing it in this light, as well as by the aid of microscopic observation, it may be inferred that the melanotic matter is *unorganised* — is merely an extravascular deposit or exudation into the areolæ either of natural structures or of morbid formations, or of both. In many cases it may even be washed away, leaving the cellular filaments or areolæ which contained it porous, spongy, and reticulated. Whatever vessels, therefore, which may be traced into melanotic tumours, belong to the structure of the part, and not to the melanoid matter itself; and when the melanoid matter is associated with morbid or new productions, the vascularity is that of these productions, and not of the matter deposited in or colouring them; no bloodvessels being traced *into* the black matter itself.

12. iv. PHYSICAL AND CHEMICAL CONSTITUTION. — The black matter itself is without any marked odour or taste. It is opaque, miscible with water or alcohol. It putrifies slowly when exposed to the air or kept in water. The stain it imparts to the hand, or to linen, is readily washed out. It has been analysed by LASSAIGNE, BARRUEL, HECHT, and HENRY; and the results of all the analyses are, that melanosis is essentially composed of the colouring matter of the blood and fatty substance. M. FOY considers that it is the colouring matter of the blood highly carbonised; and this is very probably the truth.

13. v. PROGRESS. — The progress of the disease evinces certain changes. 1st, in the melanotic deposit; and, 2d, in the structures in which it is lodged. — *A.* As respects *the changes in the melanoid deposit;* these consist *firstly* of inspissation or solidification from the absorption of the more watery part of the deposit; and, *secondly*, of the softening or liquefaction which consecutively takes place.—*a.* The *inspissation* of the matter may be slow or imperfect, as when the matter is still contained in the capillary vessels; or it may be more rapid and complete, as when it is exuded into, or combines with, the molecular structure of a dense organ. When formed in an adventitious cellular or serous tissue, or other morbid production, the changes in it, especially its inspissation, depend upon the density of the production which it infiltrates, its density resisting the diffusion of the exuded matter.

14. *b.* After solidification has been carried as far as the circumstances of the parts permit, *softening* takes place. This change is manifestly brought about by the size, situation, and anatomical relations of the morbid deposit. These occasion — 1st, an irritation in the part, and the effusion of serum in and around it.; 2d, the extinction of the vital cohesion of the tissues in which the black matter is deposited.

15. *B.* The *changes in the structures in which melanotic matter is contained* are readily inferred from what has been just stated. The irritation of the deposited matter acting upon the living tissues as a foreign and dead body, induces further changes. When the deposited matter forms a tumour, compression of the surrounding tissues is then added to irritation; the latter state, by encreasing effusion, sometimes augmenting the former, until ulceration and destruction of parts take place. The irritation produces serous effusion, softening of the containing and surrounding tissues, disorganisation with or without suppuration, and ultimately open ulceration. The melanotic ulcer thus formed is either regular or irregular; its edges are thin, soft, pale, or slightly red, or tinged with black, bevelled from within outwards; and it exudes a black fluid. If the margins of the ulcer are the seat of chronic inflammation, they become thickened, infiltrated, or projecting and hardened; sometimes they are everted, and the internal surface presents a number of excrescences. When cut through they are of a pale grey colour, and closely resemble scirrhus. Melanotic ulceration is comparatively rare, and as yet imperfectly observed.

16. vi. SYMPTOMS AND DIAGNOSIS. — The symptoms of melanosis are seldom well marked at the commencement, unless the morbid deposition occurs in parts which come directly before our senses; and it is generally not until after death that we are at all enabled to ascertain its existence. As far as the symptoms have been recorded, and as far as I have observed them in a single case which has come before me in the human subject, melanosis is chiefly characterised during the life of the patient by a gradual sinking of the vital energies, a cachectic habit of body, a dusky or ash-coloured countenance, and a marked change of the nutritive functions, giving rise to great emaciation, dropsy, a partial œdema of the cellular tissue, sometimes to effusion into the serous cavities, to a weak, quick, and small pulse, with night perspirations towards the termination of the disease; and, occasionally, when the lungs are affected, to a blackened mucous expectoration.

17. It is generally observed, that however important or necessary to the continuance of life the organ affected by this malady may be, febrile excitement never manifests itself in an active or marked form — a circumstance serving, in the opinion of LAENNEC and LOBSTEIN, to distinguish during life the consumption depending upon melanosis from that proceeding from tubercles in the lungs. But this is an insufficient source of diagnosis; for phthisis may exist without any febrile symptom beyond rapidity of pulse and perspirations. These symptoms also characterise the last stages of melanosis, but they are unattended by purulent expectoration and the stethoscopic signs of ulcerated cavities in the lungs, which are generally present in the last stage of phthisis. Melanosis does not appear to give rise to much pain. The presence of black matters in the discharges from the stomach or bowels is no evidence of the existence of melanosis, as such matters generally proceed from very different sources from this, as shown in the article MELÆNA.

18. vii. REMOTE CAUSES. — Melanosis has been met with in all periods of life, but most frequently in old age. It is not confined to the human species, but has been observed in the horse, the dog, the cat, rabbit, &c., but most frequently in the horse; and particularly those which are grey or white. As to its exciting causes, the infrequency of the disease prevents me from stating any thing with certainty. It seems, however, probable, that it is occasioned by whatever lowers the vital energies, and impedes the functions of the respiratory and biliary organs, or the decarbonising actions of the frame.

19. viii. OF THE ORIGIN AND NATURE OF THIS SUBSTANCE different opinions have been entertained. The most plausible of these refer it to an

altered state of the colouring part of the blood, arising from the presence of an extraordinary quantity of carbon; and infer that the melanoid matter is in its composition nearly allied to adipose substance, particularly as regards the quantity of carbon composing it. This seems to be the opinion of **Heusinger** and **Gohier**, who refer in support of it to the large proportion of the phosphate of iron and carbonaceous matter found in this substance upon calcination. **Laennec** considered it as a distinct species of cancer. He was evidently led to the adoption of this opinion by the circumstance of both diseases occurring in nearly similar states of the vital energies of the frame, and in analogous conditions of the soft solids — an evident cachexia, or contamination of the frame, apparently existing in both. Besides, the frequent association of this disease with schirrus and carcinoma seemed to favour this notion. But this can only be viewed as an occasional complication, as melanosis is also found associated with tubercles and other morbid productions. Moreover, the parts affected by this disease often present no signs of change beyond the infiltration of black matter; and cancerous disease is seldom so generally diffused through the various tissues and organs as melanosis is.

20. Chemical analysis has confirmed the opinions of **Gohier** and **Heusinger**, and shown that this matter offers some analogy to the colouring matter and fibrine of the blood. MM. **Breschet**, **Cruveilhier**, **Carswell**, and **Lauth** have, moreover, found it in the blood-vessels which have remained undestroyed in softened melanoid tumours. M. **Treviranus**, in experiments made by him on frogs, observed that, when the blood-vessels were deprived of the nervous influence, a black matter resembling the pigmentum of the choroid was formed in the capillaries and in several membranes. From this it may be inferred, that the black matter thus formed proceeded from the deposition of the carbonaceous particles, which, not having combined with oxygen, had not been eliminated from the blood in the form of carbonic acid, owing to deficient vital and nervous power, and to the enfeebled and retarded circulation in the capillary vessels.

21. I am therefore of opinion, that the melanoid matter is produced or secreted from the blood, owing to an enfeebled state of the vital influence of the system generally, and the capillary vessels in particular; that this state of the vital influence is insufficient for the accomplishment of the healthy changes induced in the capillaries of a part, or of the body generally; and that free carbon accumulates in these vessels, which, under the defective vital energy of the system, and diminished tone of the extreme vessels, is deposited with other constituents of the blood, 1st, in tissues not previously changed in structure; — 2d, in parts the texture of which have been variously changed; and, 3d, in new formations, as false membranes, carcinomatous growths, and other malignant productions.

22. ix. **Treatment.**—The great difficulty of ascertaining the existence of the disease previous to death, has prevented the employment of those means which might have been tried if its presence had been evinced. Upon this subject, therefore, medical literature is perfectly barren. In the uncertainty under which the physician is compelled to act in all cases of this description, the general conditions of the frame, and external manifestations of depressed vital energies, will be the chief circumstances on which he can found his indications of cure. His attention will therefore be chiefly directed to those means which are found most energetic in rousing the powers of life, imparting tone to the minute capillaries, and promoting the functions of the various assimilating and secreting viscera and emunctories of the frame. With this view, I can only suggest the employment of quinine with the mineral acids, or with camphor, and alternated with purgatives or aperients — the iodide of potassium and the liquor potassæ with compound decoction of sarsaparilla — the muriatic or chloric, or nitro-hydrochloric acids— the chlorate of potash, the chlorides, &c. In order to excite the decarbonising functions of the liver, whilst restoratives are being prescribed, chologogue purgatives should also be given occasionally. The patient should live in a pure, dry atmosphere, and take due exercise in the open air.

23. II. **Spurious Melanosis.** — Those states of parts, or of disease, that resemble true melanosis, have been fully described by Dr. **Carswell**. This spurious disease is caused, 1st, by the introduction of carbonaceous matter; — 2d, by the action of chemical agents, and by the stagnation of the blood in the capillaries. — *A. Spurious melanosis from the introduction of carbonaceous matter.* — The inhalation of the carbonaceous matter proceeding from common combustion was first supposed by **Pearson** to discolour the *pulmonary tissue*. **Laennec** afterwards entertained the same opinion; but the fact was not fully demonstrated until Dr. S. C. **Gregory** published a remarkable case which came under his care. This form of spurious melanosis occurs only in the **Lungs**, and is described in the article on the pathology of these organs (§ 185.).

24. *B. The action of chemical agents on the blood* gives rise to a form of spurious melanosis. In cases of chemical dissolution or digestion of the parietes of the stomach after death by the acid contained in the gastric juices, and in cases of poisoning by acids, the blood contained in the capillary vessels of the digestive tube, as well as that which is extravasated, frequently presents a blackish tint, so as to simulate melanosis of the part. The action of sulphuretted hydrogen gas may also give the blood in the capillaries of the intestines, and that effused in the same situation, a black colour. It is chiefly, however, in a forensic point of view that this subject becomes important.

25. *C. The stagnation of the blood in the capillaries* from loss of vital power, and independently of the action of acids, or of other chemical agents, sometimes imparts a melanotic appearance to certain tissues. This occurs chiefly in the digestive mucous surface, and in the lungs. In the former situation, it is not infrequently observed after death from pestilential cholera; in the latter organ, it occurs both in that malady, and in the more sudden forms of congestion, sometimes supervening upon organic changes in the substance of that organ, and in the bronchi.

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MEMBRANES — Pathology of. — The reader will find the *diseases* and *lesions of membranous tissues* fully discussed in the articles Brain, Bronchi, Digestive Canal, Peritoneum, and Pleura.

MENINGITIS. — See Brain (§ 3. *et seq.*).

MENORRHAGIA. — See Hæmorrhage from the Uterus (§ 220.); *and more especially* Menstruation.

MENSES, MENSTRUATION. — Synon. *Catamenia* (from *κατα* and *μην*); Καταμηνια; *γυναικεια*, Gr. — *Menstrua, menstruæ purgationes; Menstrui Cursus, profluvium mulierum*, Auct. — *Frauenzeit, Monatzeit, Monatliche reinigung*, Germ. — *Les Règles, les Menstrues, Menstruation*, Fr. — *Mestrui, Corso Mestruale*, Ital. — *The Menstrual Flux, the Courses, the Monthly Discharge, the Monthly Period, the Flowers, the Catamenia, the Monthly Indisposition.*

Classif: — General and Special Pathology. — Therapeutics.

1. The consideration of the derangements to which menstruation is liable comprises that of the chief functional disorders of the uterine system; and in all the disorders and structural diseases of this system, the states of menstruation are the most important phenomena, enabling us not only to form correct ideas as to their natures, but also to devise appropriate and successful indications of cure.

2. The derangements of menstruation have been variously *classed* and considered by systematic writers, as well as by those authors who have confined their researches to the diseases of the female œconomy. In the works of the latter, to which we are especially entitled to look for a full and comprehensive detail of these derangements, the principal only of them are discussed; and others, which are often of great importance in their local and constitutional relations, are altogether overlooked. Denman, Burns, Hamilton, Capuron, Nauche, Dewees, Boivin, Dugès, and Churchill confine themselves to the consideration of the three states of disorder usually designated by nosologists, *amenorrhœa*, *dysmenorrhœa*, and *menorrhagia*. Others have noticed, in addition to these, other derangements; but very few writers have embraced the whole of them. Carus has judiciously noticed premature, delayed, and incomplete menstruation. Dr. Blundell has comprised offensive catamenia. Joërg and Mende have not overlooked menstruation repeated too frequently, nor that which occurs not often enough or only at prolonged periods. Siebold arranges the subject into the precocious and tardy developement of the menses — excessive and scanty discharge — suppression of it — painful menstruation — and vicarious menstruation. Dr. Power adopted a classification, which might have comprised all the disorders to which this function is liable; viz. — *a.* Deficiency of the menstrual actions. — *b.* Excess of the menstrual actions. — *c.* Irregularity of the menstrual actions. The adoption of any arrangement is of no further importance than as it may the best enable us to comprise all the useful and practical considerations of the subject, in such due order and relation to each other as may be made most applicable in practice, and most advantageous in advancing our knowledge of uterine disorders, and of their relations to other affections and maladies.

3. In discussing the subject of menstruation, I shall consider, *first*, the phenomena and management of this function; and afterwards, the various disorders and irregularities to which it is liable; and, briefly, the connection of these disorders with other affections and diseases; or, more definitely, as follows: — i. The phenomena of menstruation. ii. The management of the menstrual periods in various circumstances. iii. Absent, suspended, and suppressed menstruation; comprising vicarious menstruation. iv. Painful and difficult menstruation. v. Excessive menstruation; and vi. Various irregularities of this function not comprised under the foregoing heads. The *first* and *second* of these comprise *the physiological and hygeienic consideration of the subject*; the others, *the pathological and therapeutical discussion of it.*

4. I. The Phenomena of Menstruation. — It is not intended that all the phenomena of menstruation and female puberty should be here noticed, but only those more especially connected with the disorders of menstruation and of the female œconomy. The period of commencing and of established puberty in the female has generally been viewed in connection with the occurrence of menstruation. The relation generally exists; but not infrequently we observe this function to appear, either in a regular or irregular manner, before the other indications of puberty are fully developed; and as frequently, these indications precede, for a longer or shorter period, the establishment of the catamenial flux. Much of this variability in the accession of the several phenomena of puberty depends upon the circumstances of modern society and education, which will be shown hereafter to be so remarkably productive of the disorders of menstruation.

5. Up to the period of menstruation, the ovaria and uterus merely exhibit the state of simple growth with the rest of the œconomy; but at this period they become more fully developed, and the uterus manifests the higher vital manifestations of irritability and secretion. During these local changes, the whole frame, and the mental manifestations, present greater activity of developement. The nervous system betrays encreased susceptibility and sensibility; the mind acquires extended powers of emotion and passion, and the imagination becomes more lively. The mammæ and pelvic viscera are rapidly developed; the hips and thighs enlarge; the ovaria become red and swollen; the Fallopian tubes, with their fimbriæ,

as Dr. **Ferguson** remarks, are elongated, erectile, and irritable; the uterus has acquired bulk, and a more sanguine hue; the organs of the thorax participate in the effects of that action, which is encreasing the mammæ, so that the lungs, the larynx, and even the arms acquire the contours of a maturer developement. The intensity of vitality, and the resistance of the frame to hurtful agents, are such at this period, that the mortality is less at this than at any other epoch.

6. If, on the other hand, the uterine organs continue undeveloped, and the menstrual discharge does not appear, the growth of the body is impaired, and the general character and appearance of it unhealthy, languid, blighted, and imperfectly formed. The mind is dull, weak, or depressed. The emotions and passions are imperfect, or altogether absent. The vegetative functions are less vigorous; and fat and cellular substance are formed instead of muscular tissue; the mammæ and lungs are insufficiently developed; and not only is life less intense, but it is of much shorter duration, early phthisis terminating a state of sickly and imperfect existence.

7. Much discussion has recently taken place respecting *the period at which the menses first make their appearance;* and considerable misapprehension has existed on the subject; inasmuch as this flux, when occurring very early, is not always, nor yet so generally attended as has been supposed, with other signs of developed or even of advancing puberty. I have seen in public and private practice numerous cases of very early menstruation, the flux occurring regularly for months. In one case brought to the infirmary for children, it was as early as the sixth year. I have seen several in whom the catamenia appeared as early as the tenth and eleventh years in this climate, and many in warm countries; but in most of these, this flux was the chief indication of commencing puberty. The accession of menstruation has been supposed to be much earlier in warm, than in temperate and cold climates; but this opinion has been disputed by Mr. **Roberton** and others. Having paid some attention to this subject many years ago, I had come to the conclusion, from inquiries made when travelling both in hot and in cold countries, that a considerable difference as to the age actually exists, although that difference is not so great as most physiological and other writers have stated it to be; and I am convinced that it is partly owing to the difference in the constitution of the several dark and white races of the species — that it is as much owing to this cause as to climate.

8. Besides climate, there are manifestly other circumstances, which, in certain constitutions, cause an early or premature appearance of the catamenia; and which, perhaps, in other or opposite constitutions and temperaments, tend to delay or to suppress altogether this discharge, by weakening or exhausting the undeveloped sexual organs. A number of female children sleeping in the same apartment; the intercourse of the sexes at an early age, as in manufacturing towns and cities; the temperature and circumstances in which young females are placed in cotton and numerous other factories; the excitements to which the mind is exposed in these, and in schools, &c., are, in temperate climates, the chief causes of the premature or early occurrence of menstruation, and of the subsequent irregularities of this function. The influences which are in operation in large manufacturing localities, often place young females in similar physical and moral conditions to those of the dark races in warm climates, and hence the difference of the period at which menstruation commences in both is often not very great.

9. The following table will show the years in which 1604 females experienced the accession of the catamenia.

Years.	272 Reported by M. Petrequin.	68 At Marseilles and Toulon.	160 By M. Buchacourt at Lyons.	432 At Lyons.	85 At Paris.	450 At Manchester.	137 At Goettingen.	Total, 1604.
9	—	—	—	—	1	—	—	1
10	4	—	1	5	—	—	—	10
11	10	6	4	14	3	10	—	47
12	15	10	11	26	14	19	3	98
13	33	13	14	47	6	53	8	174
14	33	9	17	50	18	85	21	233
15	45	16	31	76	54	97	32	351
16	48	8	31	79	7	76	24	273
17	32	4	26	58	6	57	11	194
18	27	2	11	38	5	26	18	127
19	12	—	9	21	8	27	10	87
20	8	—	2	9	3	4	8	34
21	4	—	—	5	—	—	—	9
22	1	—	1	1	—	—	2	5
23	—	—	—	—	—	—	—	—
24	—	3	2	—	—	—	—	5

10. From the foregoing table it will be seen that menstruation generally commences between the ages of twelve and nineteen, and more frequently at the age of fifteen, than at any other age. Although it is not always at its commencement correlative with other signs of puberty, still it must be viewed as generally connected with, and depending upon, the changes taking place in the ovaria and uterus at this period, and as being determined by the encreased developement and activity of the nervous system of organic life endowing the uterine system. That the ovaries exert an influence in determining the occurrence of menstruation was supposed by **Friend** and many more recent writers, and is not improbable. The well-known case published by Mr. **Pott**, and cases of disease of the ovaria which have occurred to Dr. **Montgomery** and in my own practice (see the case about to be alluded to), almost demonstrate this influence. Dr. **Power** attributed menstruation to the action of the ovaries. He conceived, that gestation is the natural condition of the female organs; that a female menstruates because she does not conceive; that certain changes take place in the ovarian vesicles preparatory to the transmission of the ovum, and that parallel changes are taking place in the uterus which may issue in the formation of the decidua; but that, if the stimulus of impregnation be denied, the encreased action of the uterus is not sufficient to produce that effect, although it is sufficient to cause the effusion of a fluid, which is the menstrual fluid. However this may be, there can be no doubt that the accession of the catamenia is the consequence of a periodical excitement, or irritation of the nerves of the uterine

organs acting upon the vascular system of these organs, and determining an encreased afflux of blood to them; and hence, that it is somewhat analogous to the condition in the lower animals usually denominated that of "heat." An opportunity was afforded to Dr. HOOPER of examining the organs of a female who was instantaneously killed by accident during the menstrual period. The uterus was swollen and vascular; its structure less dense than usual, and its internal membrane injected, floccy, and bedewed with menstrual fluid. The ovaries and Fallopian tubes were also swollen and very vascular. Other facts and considerations might be adduced to prove that menstruation is the result of encreased nervous and vascular activity of the uterine organs; and this view is that most accordant with the phenomena which this function evinces during disease.

11. The *symptoms indicating the first accession of the catamenia* are not always present or constant; but, generally, for some days previous to the accession of the discharge, headache, heaviness, languor, pains in the back, loins, and down the thighs, are complained of, with indisposition to exertion. There is a peculiar dark tint of the countenance, particularly under the eyes; and occasionally uneasiness or a sense of constriction in the throat, or about the thyroid gland. The cutaneous perspiration has often a faint or sickly odour, and the smell of the breath is peculiar. The mammæ are enlarged and painful, or tender. The appetite is fastidious and capricious, and digestion impaired. These symptoms continue one, two, or three days; and subside as the menses appear. At the commencement of this function, the second, third, or even the fourth period may not be attended by any discharge; it sometimes thus recurring irregularly at first, even in healthy females. The period continues from three to six days, and returns every twenty-eight days, excepting during gestation and lactation.

12. In order that this function should be duly established and sustained, the following conditions are requisite: — 1st. A healthy developement of the female organs of generation. — 2d. A certain degree of vigour or organic energy of these organs. — 3d. The absence of such lesions as impair the influence of the ovaries, or interrupt the functions of the uterus. — 4th. A certain degree of constitutional power. Upon these the healthy or regular state of the menstrual discharge chiefly depends.

13. The *duration* of the function of menstruation is very generally thirty years, but more frequently above than under this term. The periods of commencement have been shown above. Those at which the function ceases have been commonly stated at an earlier age than is generally observed in this country. Menstruation has been said to cease at about the forty-fifth year; but, judging from my own inquiries, I believe that the period between forty-five and fifty is the common period with healthy females. In warm climates this function may cease between thirty-nine and forty-five years; but in temperate climates it disappears more frequently after than before the forty-fifth year — at least in England. Mr. ROBERTON states, that of seventy-seven females, ten ceased to menstruate at forty-eight years; seven at forty-nine; twenty-six at fifty; two at fifty-one; and seven at fifty-two; the catamenia thus disappearing, in fifty-five out of seventy-seven, from the years forty-eight to fifty-two inclusive.

14. II. MANAGEMENT OF THE MENSTRUAL PERIOD. — i. *During the presence of the catamenia*, the female frame betrays encreased susceptibility and excitability; and this period is usually viewed by females themselves as one of greater delicacy and liability to be affected by injurious agents and mental emotions. It is of much importance to obtain satisfactory information as to the regularity and states of this evacuation in all cases in which the health and disorders of females are concerned; and therefore the inquiries of the physician respecting it should be careful and precise. — *a.* When the *female enjoys good health*, and the discharge is regular and natural in every respect, all that is required, during its continuance, is the avoidance of all influences, physical and moral, which may powerfully affect the body and mind. These may either suppress, interrupt, or encrease the discharge, and either contemporaneously or consecutively produce other very serious or even dangerous results. Sudden frights, fits of anger, and all powerful mental emotions may have an injurious effect upon this discharge. Bloodletting, emetics, purgatives, emmenagogues, active diuretics, the more powerful diffusive stimulants, and astringents ought not to be resorted to at this period, as they may morbidly encrease the discharge, or even altogether arrest it. Cold or warm bathing, hip and foot baths should also be discontinued during this period, especially when it is healthy or natural. Care ought also to be taken not to expose the feet to wet or cold; and to avoid sitting upon stone, cold, or damp seats, or upon the ground. Excessive exertion of every kind; long walks, long rides on horseback, or on rough roads, and prolonged dancing or standing ought also to be avoided, as tending to produce not merely an encreased discharge, but even prolapsus uteri, particularly in married females. Females subject to leucorrhœa ought not to have recourse to vaginal injections during or shortly before this period. Dr. LOCOCK remarks, that either "by accident or by criminal impatience, sexual intercourse has sometimes been permitted during this period; and, although not constantly, yet such conduct has been frequently followed by the most serious effects — generally by profuse hæmorrhage; at other times by a sudden suppression of the discharge; to which have succeeded fever, delirium, obstinate hysteria, confirmed mania, and even catalepsy."

15. ii. On *the first appearance of the menstrual period* there is generally little further required as respects the healthy young female, than great care in avoiding the injurious physical and moral influences now mentioned; and even when the second, third, or fourth periods for the recurrence of the discharge are passed over, but little may be necessary if no further disorder be manifest. If, however, the female be delicate, or is much confined in-doors, or if the bowels be habitually costive, the preparations of iron or of iodine, with emmenagogue purgatives, as aloes with myrrh, &c., may be administered, and regular exercise in the open air enjoined. A smart walk should be taken daily before breakfast, and be repeated twice in the course of the day. Confinement to

close or crowded apartments, and in close or crowded streets; and, still more, numbers sleeping in small, low, damp, crowded or ill-ventilated rooms; and deprivation of air and exercise — of the free use of the limbs in an open and healthy atmosphere, are the chief causes of the disorders of menstruation in cities and large or manufacturing towns. To these causes may be added want of sufficient sleep, prolonged mental attention and exertion, and whatever tends to impede the functions of respiration, digestion, assimilation, and muscular action. Hence all these injurious agents ought to be especially avoided at the epoch of female puberty.

16. iii. The *period of the final cessation of the menses is variable;* and even in healthy females the change may be attended by phenomena requiring discrimination on the part of the physician. This period is also one which often excites the fears of females. In a few cases, the uterine functions acquire an encreased activity shortly before their final cessation, so that females, who have not had children for years, or who have been barren hitherto, have unexpectedly become pregnant. More frequently, however, females mistake the symptoms often attending the cessation of the menses, for those of pregnancy. The passing over of the menstrual period, swelling and pain of the breasts, the sickness and disorder of the stomach and capricious state of the appetite, the increase in size, and the movements occasioned by flatulence of the bowels, often accompanying this epoch, sometimes induce a belief in the mind of even an experienced female that she is pregnant; and her exact state can be determined only by an examination per vaginam, by time, or by the exhibition of purgatives and carminatives.

17. Menstruation rarely ceases at once when the usual age at which it disappears is arrived at, unless some accidental circumstance, as fright, exposure to cold, an acute illness, &c., occurs and occasions it. More commonly the change is gradual, and is attended by irregularities, as to the intervals between the periods, the duration of the period, and the abundance or scantiness of the evacuation. Sometimes the discharge returns every two weeks, then ceases for several weeks, or even months, and afterwards recurs for a few periods as regularly as ever, and then altogether ceases. Many females of delicate constitution, who have complained much during the earlier epochs of their existence, or who, up to the period of this change, have been liable to hysterical or nervous ailments, have subsequently enjoyed a much better state of health, and lived long and healthily, when this change has been brought about carefully and fortunately. During the functional activity of the uterine organs, and whilst these organs are highly susceptible of irritation, many of the disorders depending upon irritation of them are more or less frequently experienced; but when these organs undergo the change characterising this epoch of life, the susceptibility of irritation subsides, and gradually disappears; and, consequently, the disorders which thus originate are no longer felt.

18. On the other hand, when disease already exists in some organ, or even when a predisposition to disease exists, the cessation of the menses generally aids in aggravating the former, or in developing the latter. A disorder, or even an organic lesion, which may have been so slight, or so little advanced, as to escape detection as long as the menstrual discharge has continued, and has proved a periodical derivation from the affected organ, and a recurring evacuation of the vascular system, will no longer thus remain latent, or continue stationary, but will assume an active and rapid form. The maladies which most commonly become thus developed are the various organic and malignant diseases of the uterus and mamma; gout, apoplexy, and paralysis; organic diseases of the liver; dropsies; structural changes of the lungs; cutaneous eruptions; ulcers of the lower extremities; hæmorrhoidal affections; epilepsy, hysteria, and mental disorder, &c. In many cases leucorrhœa occurs, and continues long at this epoch, and powerfully tends to prevent the vascular fulness which might develope or aggravate these or other diseases. In some instances, hæmorrhoids supervene, and have the same effect; and even the appearance of cutaneous eruptions, or ulcers on the extremities, exert some degree of derivation from an organ disposed to serious disease.

19. iv. *The medical management of impending disease at this epoch* is of great importance, and the earliest indications of disorders should be carefully watched, and duly estimated. Signs of vascular fulness, of local congestions, and of oppression of any organ, ought to be met with local depletions, which should be repeated according to the circumstances or urgency of particular cases. Vascular fulness, or visceral oppletion or obstruction, are the chief pathological conditions at this period of life; and, although local bleedings are necessary to remove impending mischief, still diet and regimen are the means on which we should chiefly depend for the permament removal of the evil. A regular state of the bowels; the occasional exhibition of a mercurial to promote the biliary secretion; a light, farinaceous, and vegetable diet, or a very moderate use of animal food; and regular exercise in the open air, are means which are applicable to all cases characterised by vascular fulness or congestions. When disease of some internal organ is actually present, and when the more acute or active state has been subdued by vascular depletions, and other appropriate means, perpetual blisters, setons, and issues will prove of service in removing the remaining irritation, and in preventing a recurrence of vascular determination to, or congestion of, the affected organ.

20. In all cases, the treatment should mainly depend upon the states of the vascular system, in connection with those of the chief viscera; nevertheless, the nervous manifestations require attention. If the nervous system be morbidly susceptible, or sensitive, the vascular system being neither too full nor oppressed, means should be used to impart energy to it, and thereby, as well as by other agents, to remove this condition. If it be connected, as is sometimes the case, with a deficiency of blood, or of hæmatozine, the ferrugineous tonics should be prescribed; and if painful or convulsive disorders be associated with this state of the vascular system, narcotics, anodynes, and antispasmodics may be conjoined with these. In most cases of sudden seizure attended by convulsions — whether epileptic or hysterical — al-

though following the cessation of the menses, anti-spasmodics and anodynes constitute a principal part of the treatment; and even local depletions should be cautiously and sparingly employed, unless the signs of general or local fulness be quite conclusive, and then they ought to be resorted to in conjunction with the remedies just mentioned.

III. Absent, Suspended or Suppressed, and Vicarious Menstruation.— Synon.— *Amenorrhœa* (from α, priv., *μηνες*, the menses, and *ῥεω*, I flow), Vogel, Cullen, Parr, Young, Pinel, &c.; *Emansio mensium, retensio mensium*, Auct.; *Paramenia obstructionis*, Good; *Ischomenia*, Swediaur; *Meneschesis*, Ploucquet; *Defectus menstruorum, suppressio mensium*, Auct. var.; *Manque des règles, suppression de règles*, Fr.; *Mangel des monatblutfluss*, Germ.; *Suppressione dei menstrui, amenorea*, Ital.; *Obstruction.*

Classif.— IV. Class. V. Order (*Cullen*). V. Class, I. Order (*Good*). — I. Class. II. Order (*Author*).

21. Defin.— *Absence of the menstrual discharge at the period of life when it is usually regularly established, or the suspension or suppression of it after it had recurred regularly for some time.*

22. This subject may be considered under three distinct heads. — 1st. Absence and retention of the menses. — 2d. Suppression of the menses; and — 3d. The complication or association of either of these with some other disorder or malady.

i. Absent and Retained Menses. — Synon. — *Emansio mensium; retentio mensium; delayed menstruation; retained menses; obstructed menstruation.*

23. Defin. — *A delay in the first appearance of the menses, owing to functional disorder or to organic change.*

24. The menstrual discharge may be delayed or absent, owing to *functional inactivity or disorder*; or it may be *obstructed or retained by organic change.* Hence, amenorrhœa presents *two forms*, the distinction between which should be preserved — the one being *simple and functional*, the other *structural and obstructive.*

25. *A.* Simple or Functional Amenorrhœa. — *Emansio mensium; delayed menstruation.* — The differences in the age at which menstruation commences have already been noticed. In some of those instances in which it has not appeared until three or four or more years after the usual period, in which it has been *delayed merely*, the amenorrhœa being simple, or uncomplicated with organic change or mechanical obstruction, it will be found that the retardation has occurred in one or other of the following states: — *a.* The developement and action of the uterine system are not correlative with the growth and health of the body. *b.* The developement of both the uterine organs and the whole frame is apparently natural. *c.* The uterine functions are insufficient to produce a coloured discharge, uterine leucorrhœa being substituted. — *a.* Some of the cases of simple amenorrhœa are actually instances of protracted puberty, the whole frame betraying imperfect growth; but care should be taken to ascertain the nature of the case, and the absence or presence of malformation or obstruction of the kind about to be noticed (§ 39.). Siebold and Churchill distinguish two principal conditions of the system in this form of amenorrhœa, viz. a plethoric state conjoined with rigidity of fibre and robust health; and somewhat of deficiency of blood, or laxity of fibre, associated with pallor, and a weak or delicate constitution. In both, an apparent attempt at menstruation occurs occasionally, or even monthly; and is characterised by pains in the back and loins; by weight in the lower part of the abdomen; by aching in the tops of the thighs, with lassitude and uneasiness; and sometimes by constriction about the thyroid gland. After two or three days these symptoms cease, without any menstrual evacuation, or merely with leucorrhœal discharge; and are often succeeded by severe headaches, with intolerance of light and sound. In the more plethoric cases, these sufferings are severe, and occur occasionally between the efforts at menstruation, and are attended by flushings and throbbings of the face and head; quick, full pulse, thirst, and general febrile action. In the pale and delicate, there is little or no fever, and the symptoms are slighter and more chronic. As these disorders continue or occur, the functions of the digestive organs languish; the bowels become irregular; the countenance pale; the strength reduced; and the breathing short; and the general health gradually declines. Various hysterical symptoms, or even severe hysterical paroxysms, particularly in the more plethoric cases, occasionally appear; and severe attacks of disease of vital organs are apt to occur, from the influence even of their less energetic exciting causes. Nauche met with two instances of fatal disease of the brain in this state of menstrual obstruction. I have seen a similar instance, attended by epileptic convulsions, and terminating in fatal coma; also cases of pneumonia, and of congestion of the lungs, in similar circumstances; but most frequently, particularly in the more delicate class of cases, this form of amenorrhœa assumes the complicated state about to be noticed, and the patient passes into chlorosis or into tubercular consumption; or becomes first chlorotic, and subsequently consumptive. In a few cases, however, diarrhœa or some discharge occurs and protects for a time the patient from the more dangerous consequences of the obstruction; or some evacuation takes place, from time to time, which proves vicarious of the menses, as will be noticed in the sequel.

26. Dr. Churchill states that he has repeatedly examined the uterus of patients labouring under amenorrhœa; the cervix uteri has generally been small, and more pointed than usual during the interval; but in all these cases a small-sized bougie could be introduced into the cavity without pain or difficulty. During the abortive efforts at menstrual discharge an enlargement of the cervix takes place, particularly in those cases which are attended at this period with some leucorrhœal discharge.

27. *b.* The *diagnosis* of simple amenorrhœa has reference chiefly to its simple or uncomplicated state. 1st. To the absence of malformation and mechanical obstruction. 2d. To the existence of some other disorder or malady, which may have preceded or caused this condition, or which may be complicated with it. If there be periodical exacerbations (which do not always attend simple

amenorrhœa, but generally that caused by mechanical obstruction), an examination will readily detect the existence of an obstructive cause. When these exacerbations are evinced, and no local impediment exists, the form of the disorder now being discussed may be inferred to exist; and this inference will be confirmed if they be attended by a colourless discharge, or leucorrhœa.

28. *c.* The *prognosis* of this form of amenorrhœa should be stated with caution or reservation in respect of the ultimate result, particularly where it is unattended by periodic efforts (§ 25.), or leucorrhœal discharge during these efforts. The more immediate consequences are those complications presented by the disorder as it becomes prolonged; as chlorosis and disorder of the general health; continued leucorrhœa; sterility, at least during this state of the uterine organs; tubercular consumption, various nervous ailments, anæmia, scrofulous diseases of the glands or joints, organic lesions of the heart, epilepsy, hysteria, &c. The more acute, but rarer consequences of simple amenorrhœa, are inflammations of, or effusions on, the brain and its membranes; hæmorrhagic attacks; inflammations or congestions of the lungs, &c., as noticed above (§ 25.).

29. *d.* The *causes* of amenorrhœa have been generally considered to be indolence, and sedentary lives; gross diet, luxurious habits, hot rooms, soft beds, and too much sleep — causes which may have some influence in producing the complaint in some constitutions, but which are often less influential than others that have been entirely overlooked, more especially sleeping in close and crowded rooms; want of exercise in the open air; constant mental exertion and occupation at the period of approaching puberty, to the neglect of the physical aids of bodily developement; early masturbation and all over-exciting and debilitating and exhausting influences; the vicious system of modern and fashionable education; the occupations of the poorer classes during the period of puberty, especially employments in warm, ill-ventilated, and crowded rooms and factories; insufficient sleep, prolonged exertion and attention, before and during the period of commencing menstruation; residence in cold, damp, and malarial localities, or low cellars; prolonged exposure to cold, and insufficient clothing; nostalgia and depressing mental emotions.

30. *e.* The *pathological conditions* to which amenorrhœa has been attributed are chiefly theoretical — entities of the imagination, such as spasm of the extreme vessels; torpor of the vessels; engorgements of the vessels, &c. The true condition is most probably an imperfect developement, or impaired energy, or both states conjoined, of the uterine organs, arising from causes which impair or exhaust the organic nervous energies during the progress of growth, or from circumstances which determine these energies to the brain. Those cases of simple amenorrhœa which are characterised by vascular plethora furnish no argument against this view; as this state of the vascular system may exist in connection with inactivity of the uterine organs.

31. *f.* TREATMENT. — It is obvious that the management of amenorrhœa should be based upon the pathological condition of particular cases as far as it is manifested, and be directed with reference to the abortive efforts which may periodically occur. If the obstruction be attended by general vascular fulness and robust health, local or even general bleeding, but chiefly the former, may be prescribed; and preferably at the commencement of, or a day or two before the periodic effort, or recurrence of the leucorrhœal discharge accompanying it. In London and large towns, local bleeding only is required — general bloodletting almost never, or only when the complexion is florid, the habit plethoric, and the fibre rigid. It has been recommended, particularly by obstetric writers, to apply leeches to the vulva in these cases; and to take blood by cupping on the loins. Generally, however, the application of leeches to the insides and tops of the thighs, just below the groins, is to be preferred, both as being more agreeable to young females than the other modes, and as being equally efficacious. Indeed, cupping on the loins is not to be confided in for simple amenorrhœa; and it may even be injurious, although prescribed for inflammatory states of the uterine organs. I have seen it cause suppression of the menses when thus employed.

32. Next to local bloodletting, in the more plethoric cases, *active purging* by means of calomel, aloes, extract of colocynth, &c., with assafœtida, myrrh, &c., is the most efficient remedy; particularly when persisted in for some days before, and even during, the periodic efforts. In the intervals between these, the *emmenagogue purgatives* may be given with the stimulating emmenagogues, or with the biborate of soda; and the patient should live partly, or chiefly, on fish and shell-fish; take regular and active exercise in the open air; and use the hip-bath, especially at the periods adverted to. Having removed vascular fulness by these means, and the catamenia not yet appearing, the treatment may be conducted in many respects as may be appropriately directed for cases characterised by delicacy of constitution, or impaired organic nervous energy, connected with deficiency of blood, or of hæmatosine.

33. For this latter class of patients, the *chalybeate preparations*, particularly the compound steel mixture (GRIFFITH's); the tinctura ferri sesquichloridi, or the vinum ferri with tinctura lyttæ; the carbonate of iron, in the form of electuary, with confection of scammony and confection of black pepper; the compound steel pill with the aloes and myrrh pill; the iodide of iron; the tincture of *iodine*, or the iodide of potassium with tonics; chalybeate mineral waters; the tinctura lyttæ, or tincture of capsicum with tonic infusions; or pills consisting of ox-gall, assafœtida, myrrh, and capsicum, will severally be employed with frequent, although not with constant, advantage. Dr. LOCOCK recommends pills consisting of myrrh, aloes, sulphate of iron, and oil of savine — a combination often prescribed by the celebrated Dr. GREGORY.

34. Dr. BARDSLEY prescribed *strychnine*, commencing with doses of one-twelfth to one-fourth of a grain, twice or thrice a day, that may be slightly increased after a time, or given somewhat more frequently. Headache or twitchings of the muscles require the suspension of it. NAUCHE also employed it successfully, but gave it in larger doses. The cases, however, in which it was most beneficial were those of suppression of the menses. I have preferred the extract of nux vomica in combination with aloes, commencing with half a

grain of the former, twice or thrice daily. It manifestly acts, as Dr. BARDSLEY contends, by stimulating the uterine organs and improving the tone and vigour of the system. *Aconite* has been likewise tried, and apparently with advantage, by some German and French physicians. I have prescribed the alcoholic extract of aconite with decided benefit. Besides these, various other remedies have been recommended, particularly the balsams and turpentines, melampodium, savine, cantharides, assafœtida, conium, the ergot of rye, &c. This last has been favourably noticed by DEWEES, LOCOCK, ROCHE, NAUCHE, and PAULY. During the use of these medicines, and particularly of the chalybeate preparations, a full dose of calomel with aloes should be given once in the week at bed-time, and be followed by the compound decoction and tincture of aloes in the morning. The *ammoniated tincture of guaiacum* has been much used for this complaint, and has been very favourably noticed by Dr. HANNAY and others.

35. Various *stimulating enemata* have been advised, particularly those with spirits of *turpentine, assafœtida, aloes, rue, savine,* (see F. 130, 131. 134. 135. 141. 150.). Dr. SHÖNLEIN prescribes an enema with aloes to be thrown up at the period when the effort at menstruation takes place. At that time, two or even more of the above substances may be employed with advantage, as proved by some cases in my own practice.

36. The *local excitement* of the uterine organs by means of medicated bougies and injections was recommended by the ancients and by the older writers, and has been advised by some modern authors. LAVAGNA prescribed a few drops of the liquor ammoniæ in an ounce or two of milk to be thrown into the vagina, and several physicians have tried this practice. Dr. BLUNDELL has noticed it favourably. The injection of a few drops of eau de Cologne in warm milk was a domestic practice in this complaint in some parts of the continent. The safety of the practice entirely depends upon the particular circumstances of the case in which it is resorted to. There can be no doubt of the practice being hazardous, if it be not cautiously employed; inflammation not only of the vagina, but of the uterus also, being likely to follow the use of a too strong injection.

37. It has been attempted to excite the uterine organs sympathetically by *irritating the mammæ.* Dr. LOUDON applied leeches to the mammæ with this view. SIEBOLD recommends warm fomentations; Sir JAMES MURRAY, exhausting glasses; and several writers, blisters, stimulating plasters, sinapisms, &c. to the breasts, with the same intention. I have prescribed *blisters, sinapisms,* and *issues* to the insides and tops of the thighs; *frictions* to the loins and back, with stimulating and rubefacient liniments; and *embrocations* of a similar nature applied more constantly in the same situations, with marked advantage. *Electricity* and *galvanism* directed across the uterine organs have been advised by THOMANN, ALBERTI, BIRCH, CAPURON, RITTER, MARCUS, ALDINI, NAUCHE, SIEBOLD, and many others. The *hip-bath,* or mustard hip-bath, and *mustard pediluvia,* are generally of service about the accession of the periodic efforts at menstruation. If these efforts are attended by leucorrhœa, the treatment does not require any material change from that above advised; but if the colourless discharge continues or appears in the intervals, it then becomes an important complication, which will be noticed hereafter. Of other means which have been tried in this form of obstruction, notice will be taken in the sequel, as being equally appropriate to suppression, as to absence, retardation, or deficiency of the menses.

38. The *diet* and *regimen* should have strict reference to the pathological states of each case. In the plethoric, the diet should be spare; and consist chiefly of salt-water fish, and vegetables. In the delicate, weak, and chlorotic, the diet ought to be nutritious, digestible, and sufficient in quantity to supply the deficiencies in the blood and frame generally — new eggs, mutton, game, and wine being allowed. Regular exercise on foot or on horseback, and the more active amusements and exercises, should also be indulged in, especially in the open air.

39. *B.* AMENORRHŒA FROM CONGENITAL MALFORMATION AND ORGANIC LESION. — *Obstructed Menstruation; Retained Menses.* — The following malformations and organic lesions may occasion amenorrhœa. — 1st. The ovaria may be wanting or diseased. — 2d. The uterus may be absent. — 3d. Both the ovaria and uterus may be wanting. — 4th. These organs being present, the canal of the cervix uteri may be nearly or altogether obliterated. — 5th. A false membrane may cover the os uteri. — 6th. The vagina may be wanting. — 7th. The vagina may have had its canal obliterated, or the orifice closed by adhesion of the lower portion and labia. — 8th. The hymen may be imperforate. The most of these lesions are *congenital,* others are the *consequences of disease* previous to full puberty.

40. *a. Of the congenital lesions* some affect the character and developement of the whole frame, others have no such effect. — *a. Deficiency of the ovaria* is attended by a more or less masculine developement of the body at and after the period of puberty. The mammæ and external genitals are not duly developed; the sexual propensities are not manifested; the voice is harsher and deeper than usual; and a beard is observed on the upper lip. The general health may not be affected.

41. *b. Absence or malformation of the uterus* has been noticed by SIEBOLD, LAUTH, ANDRAL, CHAUSSIER, STEIN, and others. If the ovaria exist in cases of absence of the uterus, the general developement of the body may not be affected; but if they be also wanting, in addition to the masculine character, or mixture of masculine with feminine peculiarities, the vagina, on examination, will be found to terminate in a cul de sac, the cervix and os uteri will not be detected, or not be developed, and the uterus will not be felt from the rectum. In these cases, also, the general health may be little affected.

42. *c. When the vagina is wanting,* both the ovaria and the uterus being present, the menstrual secretion may take place, its exit only being prevented, producing distension, sometimes to an alarming extent, of the uterus. The fulness in the hypogastrium is augmented at monthly periods, and the general health is very much affected. The outward signs of female puberty are present; but the vulva or external parts present no vaginal canal, or merely a commencement of it. In these cases, the patient loses her complexion — becomes pale, delicate, and thin. She complains of pains in the

back, loins, and hips; of distension of the hypogastrium, and of a sense of weight and bearing down. These symptoms are encreased every month. The abdomen increases in size; and the density of the swelling is shown by percussion. The distension of the uterus may proceed to rupture of its parietes and to the escape of the contents into the peritoneum, followed by rapidly fatal peritonitis; but more frequently death takes place from the general disorder, with prominent affection of some vital organ, before rupture takes place.

43. *d. Imperforate hymen* may be attended by many of the symptoms accompanying the early stages of absence of the vagina; but even if the cause of disorder be not attended to, the distension of the vagina may rupture the hymen before fatal injury be produced. In this case, as well as in the others, careful examinations, which ought always to be made, will show the nature of the mischief, and the mode of its removal.

44. *β. The organic lesions occasioning amenorrhœa* are as follows: — *a. Disease of the ovaries.* Dr. Churchill states, that Dr. Montgomery met with a case of a female with an obscure abdominal affection, who had menstruated for a time, and amenorrhœa occurred. On examination after death, it was found that there was only one ovarium, and that one had become completely disorganised. A delicate female was attended by several practitioners in succession, and lastly by Dr. Farre and the author. Puberty was imperfectly developed, and the menses had not appeared at the usual term. She subsequently died of acute febrile phthisis. The uterus was found extremely small, and the ovaria remarkably atrophied and converted into a dense fibro-cartilaginous substance. The inspection was made in my presence by two gentlemen who had attended my lectures at the Middlesex Hospital.

45. *b. The canal of the cervix uteri may have become impervious, or the os uteri may be covered by a false membrane.* Cases of this kind are not so rare as was formerly supposed. These lesions, however, are more frequently a cause of suppression than of retention or primary absence of the menses. Instances illustrative of these have been furnished by Rathieu, Dussaussoy, Osiander, and Storr; but their importance, from their frequency, was especially insisted upon by Dr. Macintosh. They are usually the consequences of inflammation, which also may occasion accretion of the sides of the vagina, and obliteration of the canal. Indeed, cases of congenital obliteration of the canal may have arisen from the same cause during, or soon after, fœtal existence. It is obvious that, in those circumstances, the symptoms of the accumulation of the menstrual secretion in the cavity of the uterus will be much the same as those accompanying absence of the vagina (§ 42.), but they may not become so extreme, as an attentive examination will show the nature of these cases, and a carefully conducted operation may remove the cause before they become urgent or dangerous.

46. *c. The labia or lower part of the vagina, or both, may have become adherent,* at any period before puberty; but most frequently before nine or ten years of age. This lesion may follow inflammation of the vulva, or vagina, occurring either primarily or as a simple disease, or as a complication or consequence of exanthematous or other fevers. In these circumstances the menstrual discharge may burst the obstruction; but much more frequently its accumulation is attended by similar phenomena to those which arise from retention caused by imperforate vagina or imperforate hymen (§ 42, 43.).

47. *γ. The prognosis and terminations of this form of amenorrhœa* entirely depend upon the evidence furnished as to the nature of the malformation or organic lesion. When there is reason to infer the absence of the ovaria or uterus, or both, no immediate risk of life may be dreaded, although pectoral or other disease is apt to supervene and carry off the patient. If, however, these organs are present, and the discharge accumulates in the uterus, the result will entirely depend upon the nature of the obstruction, and the possibility of removing it before the general health suffers so severely as to prevent recovery. All these cases, however, are attended by various contingencies, even after the immediate cause of obstruction is removed, that forbid a confident, or other than a cautious, prognosis; and these contingencies relate not only to the state and liability to disorder of the sexual organs, but also to the condition and predisposition to disease in the lungs and other organs.

48. *δ. Treatment.*—It is obvious that where the uterus and ovaria are malformed and disorganised, no means can be of service. But where the obstruction is seated in the canal of the cervix, in the os uteri, in the vagina, or vulva, well devised methods may remove it. Even when it is caused by congenital absence of the vagina, the case may be highly dangerous; but it is not hopeless, as shown by one in which M. Amussat (*Gazette Médicale*, Dec. 1835) operated. He succeeded in making a passage through the cellular tissue interposed between the urethra and rectum, until he reached the tumour in the pelvis formed by the distended uterus, and punctured it; he afterwards established an artificial vagina and os uteri, and ultimately restored the patient to health.

49. When the obstruction consists of occlusion of the cervix uteri, or os uteri, from either of the changes noticed above (§ 45.), an artificial opening should be made by a trocar, or by a similar instrument to that employed by Mr. Stafford for dividing strictures of the urethra. If the membrane covering the os uteri be thin, or internal to the orifice, it may be punctured by a strong probe. When the vagina cannot be perforated, as in M. Amussat's case, the uterus may be punctured from the rectum, and its contents evacuated. In cases requiring these operations, both external and internal means should be used to prevent or remove inflammatory action, as fomentations, poultices, laxatives, anodynes, and refrigerants.

50. If the vagina or labia have become united, the adhesion may be ruptured by forcible separation; but, if this be insufficient, such an operation as the case may suggest should be attempted. Where the hymen is imperforate, the difficulty is much less, and is readily removed.

51. When the menstrual discharge is accumulated in the uterus, and has only been obstructed mechanically, the removal of the obstruction is followed by the escape of a dark, thick, treacle-like fluid, which continues to run for some days as the uterus slowly contracts. Dr. Churchill recom-

mends the vagina to be syringed in these cases with warm water, and a broad binder to be applied around the abdomen. Care should be taken to preserve the passage open, and to promote the evacuation at the usual periods, until it is regularly established. Exercise in the open air, a regular state of the bowels, chalybeate medicines, and the usual means of promoting the general health, are the most appropriate to these cases.

52. In some cases, where the menstrual secretion has been accumulating in the uterus or vagina, or in both, the absorption of the more watery parts has left the accumulated matter not only thick, but grumous and gritty; and the internal surface of these organs have become inflamed and ulcerated, and their parietes thickened; very serious, difficult, and chronic disease of the uterus and its appendages thus becoming disclosed by, and following, the removal of the accumulated matter.

ii. SUPPRESSION OF THE MENSES. — *Suppressio mensium; Amenorrhœa suppressa; Suppressed menstruation.*

53. DEFIN. — *Disappearance of the menses, after having been established for a longer or shorter period, independently of pregnancy or of their ultimate cessation.*

54. Suppression of the menses may take place *suddenly* or gradually. It may occur during the period of menstruation; or the discharge may not appear either at or after the usual period. It may appear *gradually*, each successive discharge being either more scanty, or longer deferred. Thus the suppression may be *acute* or *chronic*, although cases will often occur to which the one term may be as applicable as the other.

55. *A. Acute suppression of the menses* is generally *caused* by exposure to cold, or by wet feet, bodily shock, or by violent mental emotions either just previous to, or during the menstrual discharge. The depressing passions, anxiety, insufficient clothing, and want or misery, may also produce it. Fevers, and acute diseases occurring shortly before the period, and sexual intercourse during it, will often have the same effect.

56. The phenomena or consequences of sudden suppression vary with the habit of body and temperament of the patient. In plethoric and robust females, fever, hot skin, headache, full or hard or bounding pulse, &c. are produced; and, not infrequently, most severe attacks of disease, according to the predisposition of the different organs, are the results. Hæmorrhages, inflammations, apoplexy, epilepsy, palsy, leucorrhœa, &c. are often thus occasioned. Females of a less plethoric habit of body, or of the nervous temperament, are liable to be seized with hysterical convulsions, or spasms; or with hysterical affections of various kinds; these latter often changing their seats and forms — with neuralgic pains in different situations — with syncope, or with palpitations — with aphonia, or with nervous cough — with vertigo or with headaches — with nausea or vomiting — with pains in the back, sides, or abdomen — with retention of urine, or with partial palsy or paraplegia — or with any of the affections mentioned in the articles HYSTERIA and NEURALGIA.

57. *B. Chronic suppression of the menses* is commonly a consequence of the acute, or of general debility or ill health. It may also proceed from disease of the ovaria or uterus; or from the gradual developement of organic change in some remote or vital organ, as the lungs, liver, stomach, head, or kidneys. This form of suppression may be gradual as to quantity, or the discharge may become pale by degrees, or it may appear after longer intervals, being also more scanty until it ceases altogether; or it may be variously irregular and uncertain, or painful, or difficult, and then disappear. In some instances it ceases, and leucorrhœa takes its place. It may even alternate with leucorrhœa. It may follow low, typhoid, or adynamic fevers, or other diseases which diminish the quantity, or impair the quality, of the blood; or in which large quantities of blood have been lost. I have met with many cases in which it continued long after recovery from continued fevers; the evacuation having been regular up to nearly the attack of fever, but not returning until many months after recovery from it.

58. The attendant and consequent phenomena of chronic catamenial suppression are impairment of the general health, disorders of the digestive organs, diseases of the lungs, cutaneous eruptions; various nervous or hysterical or painful affections; chlorosis or anæmia; partial attacks of palsy, curvatures of the spine; obstinate constipation and fæcal accumulations in the large bowels, disorders of the excretion of urine, &c.

59. *C.* The *diagnosis* of suppressed catamenia is of much importance. It is necessary to ascertain — 1st, whether or not the patient be pregnant; and, 2d, if the patient be not pregnant, whether or not the affections or diseases associated with the suppression be the causes or the consequences of it.

60. *a. Pregnancy* cannot be inferred to be the cause when the suppression takes place suddenly, or from any of the more energetic causes producing it, during the period of the discharge. The arrest of menstruation by conception is generally unattended by other unpleasant symptoms, but it is commonly followed by morning sickness, by alteration of the volume of the breasts, and of the sebaceous glands and colour of the areolæ. The difficulty of distinguishing between pregnancy and morbid suppression of the menses, occurs chiefly in unmarried females, but only during the earlier months of utero-gestation; and even during these months, an examination of the mammæ, of the abdomen, and per vaginam, will disclose the nature of the case. Instances, however, may occur, of pregnancy with a periodic coloured discharge from the vagina; and this may be as abundant during two, three, or more periods as usually experienced by the patient. In these cases, the evacuation generally possesses an hæmorrhagic character, and either proceeds only from the os or cervix uteri, or from a minute separation of that portion of the ovum near the cervix.

61. *b.* In most cases of acute disease appearing in connection with acute suppression of the catamenia, there will be no difficulty in determining the exact relation in which the one may stand to the other; but, in cases of chronic or organic diseases occurring in connection with chronic suppression, it is often difficult to infer whether the former or the latter has preceded the other. Most frequently, however, and particularly as respects pulmonary disease, the suppression is the conse-

quence of such disease, although various concurring causes may assist, particularly if it have taken place somewhat suddenly. Still disease of the lungs, or of the brain, or of any organ may follow suppressed menses, according to the predisposition of these organs, at periods more or less remote from the suppression.

62. The affections themselves, which appear consequently upon suppression of the menses, require to be distinguished from each other — especially those which are truly inflammatory from those which are nervous or spasmodic, or consist chiefly of altered sensibility. What I have stated in the articles HYSTERIA and NEURALGIA will assist the diagnosis; and generally it will be found, that, when the disease is inflammatory, the local and constitutional symptoms nearly correspond with each other, and with the state of the organic functions; but, when the affection is nervous, although the pain and distress may equal or even exceed that caused by inflammation, the constitutional disorder will be slight, the pulse and the organic functions being but little disturbed.

63. *D. Prognosis.* — The opinion as to the consequences and ultimate results of suppression of the menses will necessarily depend upon the nature of the causes, physical and pathological, which have occasioned it, and upon the effects of the suppression in those organs which most frequently sympathise with the genital organs, more especially the lungs, brain, and vascular system. The prognosis, therefore, depends chiefly upon the antecedent disorder or consequent malady which may present itself; the suppression, however, being a circumstance rendering an opinion of these still more unfavourable than it might otherwise be; although, in itself, and devoid of all complication, it may be only a passing or contingent disorder, which nature alone may remove, or which a judicious exercise of art may assist her in overcoming.

64. *E. Treatment.*—*a.* The *acute form of suppression* of the menses may be inferred, from what has been stated above, to be more amenable to treatment than the chronic. The means usually employed to recall the discharge are more especially indicated for it; but these should be selected with reference not only to the cause of suppression, but also to the antecedent state of health, and the associated or consequent disorders. In many cases, the hip-bath, warm mustard pediluvia, and warm drinks upon getting into bed, if employed immediately upon the occurrence of suppression, will remove it. If fever or local inflammations or congestions follow, bleeding, especially by leeches applied below the groins; the more emmenagogue purgatives, particularly calomel with aloes, &c., the spirits of turpentine in enemata, and diaphoretics with diuretics, are requisite. If the suppression be followed by severe cerebral symptoms, as phrenitis, coma, apoplexy, epilepsy, &c., as occasionally observed, the derivative bleeding should be carried as far as the circumstances of the case will suggest, and be aided by other derivative means, and by cold applications to the head, &c. In other and less urgent cases purgatives should be prescribed so as to excite, and determine the circulation to, the pelvic viscera, without producing copious discharges, which, if produced, may be injurious by deriving the current of circulation from the uterine organs.

65. If, however, the suppression occasion, as not infrequently observed, inflammation of the uterus or of the ovaria, or of both, — consequences which are often overlooked, particularly when slight or sub-acute, or when occurring in unmarried females, — vascular depletions, cooling diaphoretics and aperients, derivatives and the other means advised for inflammations of the *ovaria* or of the *uterus* are requisite.

66. In most instances, the chief efforts to restore the catamenia should be made shortly before the approach of the next period. Leeches may then be applied to the groins; and a hip-bath, or pediluvia; warm clothing, especially around the hips and thighs; and emmenagogue purgatives, may also be prescribed. The following have proved efficacious in many instances: —

No. 291. ℞ Hydrarg. Chloridi, gr. xii; Aloës Socot. ℈ j: Pulv. Capsici ℈ j.; Olei Juniperi Sabinæ q. s. *m.* Fiant Pilulæ xij. quarum capiat duas omni nocte.

No. 292. ℞ Sodæ Biboratis ʒ ss.; Aloës Socot. Pulv. Capsici, āā ℈ j.; Olei Lavand. q. s. *m.* Fiant Pilulæ xviij. quarum capiat duas ter quotidie.

67. Whilst evacuations are required in connection with such means as may excite the uterine discharge when suppression occurs in strong or plethoric females, or occasions acute disease of some important organ, as the brain, lungs, liver, or uterine organs themselves, other means are often necessary, when the suppression takes place in spare, delicate or nervous females. It should not be overlooked, however, that local inflammations or congestions may occur in these persons, in such circumstances, and require a somewhat similar, although less energetic practice; but more frequently suppression in them demands a recourse to antispasmodics in conjunction with narcotics. The external and internal derivatives, the emmenagogue purgatives and enemata, already mentioned, and, in many instances, the application of leeches below the groins, at the proper period, should be prescribed; but, in addition to these, antispasmodics, such as ammonia, assafœtida, castor, camphor, madder, capsicum, rue, savine, &c., variously conjoined with each other, and with conium, or stramonium, or belladonna, digitalis, &c., may be prescribed, particularly when much pain is complained of, or spasms occur, in consequence of the suppression. In some of these cases, the suppression is favoured by poor or deficient blood; and in these, the preparations of iron should be combined with one or more of the above antispasmodics and narcotics.

68. *b.* The treatment of *chronic suppression* of the menses should also be dependent upon the cause, and upon antecedent and consecutive disorder. If it proceed from progressive organic disease in the lungs, liver, or other organs, the treatment should be mainly directed to the diseased part; although, even in these circumstances, local depletions in the situation already stated, and other derivative means, may be employed with benefit. When it is caused by repeated or severe inflammations of the ovaria or uterus, the means should have reference to these. The ovaria, however, may be so changed by inflammation, as to be incapable of exciting the vascular activity of the uterus so as to produce the menstrual discharge; but these changes are rather inferred from the history of former disorders, than manifested by existing phenomena. When the

uterus is affected so as to obstruct the discharge, or to cause its retention, without preventing its production altogether, the nature of the lesion may be ascertained, and a remedy be found. Inflammation may close the cervix uteri, or cover the os uteri with a false membrane, or may even obliterate the vagina, as noticed above. In these circumstances, the means already indicated (§ 49.) should be resorted to.

69. Even when the obstruction cannot be referred to organic disease of the ovaria or of the uterus, there may be still great congestion of these organs; requiring local depletions for its removal. Many of these cases present indications of debility, and are attended, moreover, by leucorrhœa, which may be either periodic, or more or less continued, this discharge being often considered as a consequence of debility merely. But the local congestion may be considerable nevertheless; and although the general pallor and state of the circulation may indicate some degree of anæmia, the uterine organs may contain an undue proportion of blood. In these cases, the employment of stimulating injections per vaginam, as advised by the ancients, and revived by some moderns, might convert suppression from congestion into actual inflammation of the uterine organs; and in those cases where the congestion and suppression are associated with leucorrhœa, a recourse to astringent injections, in order to remove the latter, may be followed by the same bad consequences, if local depletions, and other suitable means directed to the removal of the congestion, have not preceded such injections.

70. When uterine congestion or inflammatory action is not present, or has been removed, the treatment should depend much upon the states of the vascular system, and of organic nervous power. If the former be not plethoric, and if the latter be much impaired, the preparations of iron, with iodine, or other appropriate medicines; the ammoniated tincture of guaiacum, the stimulating antispasmodics, and external and internal derivatives, are generally serviceable.

71. iii. COMPLICATED AMENORRHŒA. — I have already noticed (§ 57.) some of the most important associations of amenorrhœa, and shown that the obstruction, particularly when taking place slowly, or becoming chronic, is often owing either to debility or some constitutional infirmity, or to the gradual developement of some organic malady, as of the lungs, brain, liver, &c. The complications most frequently observed are, — *hæmorrhage* from various parts, *inflammations*, *phthisis*, *epilepsy*, *hysteria*, *chlorosis*, *anæmia*, *palsy*, *retention of urine*, *chorea*, *cutaneous eruptions*, *diarrhœa*, and various *disorders of the digestive organs*. These require a few remarks.

72. *A.* Amongst the most important of these are *vicarious hæmorrhagic discharges* from some organ or part, or *vicarious menstruation* as it has been commonly, but incorrectly, termed. These discharges, occurring during suppression, have been thus termed owing to their recurrence; but, although recurring, they are not always strictly periodic, or of monthly appearance. Writers have been more desirous of recording cases of this description, than of observing carefully the procession of the morbid states constituting them; and several have viewed the hæmorrhagic discharge as an eruption of the menses in some singular locality in place of from the uterus, instead of observing the sequence of morbid actions, and the relations between the contingent or vicarious discharge and the suppression. Thus hæmatemesis is a not infrequent form of the vicarious discharge, and is usually attributed to a periodic determination of blood to the villous surface of the stomach, instead of the uterus; but, without denying that such is sometimes the case, I have met with instances which have led me to infer, that hepatic or portal obstruction has taken place in plethoric persons, and given rise to hæmorrhage from the stomach, which either has anticipated and substituted the catamenia, or has occurred in connection with suppression, and often in consequence of the operation of the same causes as have produced suppression. The same remarks apply equally to the substitution of a hæmorrhoidal discharge.

73. The causes of suppression, also, particularly those which determine the flux of blood from the lower portion of the body to the head, not infrequently induce epistaxis, or even hæmorrhagic discharges from the ears, eyes, &c., especially in those who are constitutionally or otherwise disposed to epistaxis, or hæmorrhages from these parts. In these cases, the irregular distribution of blood — the diminished determination of it to some parts and its accumulation in others — is followed by its discharge from these tissues of the congested organ or part, which most readily admit of its escape. The circumstance of these vicarious discharges generally following, and but rarely anticipating, the precise period at which menstruation should have occurred, sufficiently indicates the nature of these occurrences. Besides the situations already mentioned, hæmorrhagic discharges may recur in connection with amenorrhœa, from the bronchi or lungs, the gums, the fauces, the mammæ, the urinary bladder, the bowels, from ulcers in any situation, from varicose veins, &c. Of the associations of amenorrhœa with *inflammations* or with *phthisis* which are of frequent occurrence, either preceding the other, no further notice need be here taken, than that the former are more obstinate and unfavourable when thus allied, — and that the latter proceeds much more rapidly to its usual termination when it is thus complicated.

74. *B. Epilepsy* is generally consecutive of acute amenorrhœa when observed in connection with it; but the numerous and varying forms of *hysteria*, whether assuming a spasmodic or a neuralgic or painful form, may either precede or follow the suppression. The same remark may be extended to *chlorosis*, *chorea*, and *anæmia*, either of which is often thus associated, and more or less intimately dependent upon amenorrhœa. The different forms of *palsy* are rarely seen connected with suppression otherwise than as a consequence of it. I attended, a few years ago, with Mr. FLOCKTON, a young lady who was afflicted with prolonged amenorrhœa, followed by paraplegia, retention of urine, diarrhœa, and occasional attacks of vomiting, with which the diarrhœa often alternated. She had been many months in this state, and a great diversity of treatment had been employed without avail. The disease was ultimately removed by means which will be noticed in the sequel. Disorders of the digestive and cutaneous eruptions are too varied in their characters to require notice in connection with amenorrhœa.

75. *C.* The *prognosis* in complicated amenorrhœa depends upon the nature of the associated disease. It has generally been considered that the *hæmorrhage* which often occurs vicariously in some cases of this description is not attended by any risk, and is not followed by other disease, or even by much functional disorder. But, although this may be true in the majority of cases, more particularly as respects epistaxis, hæmorrhoids, hæmatemesis, &c., it by no means generally obtains, especially as regards hæmoptysis, and hardly as respects hæmatemesis. Hæmoptysis should always be viewed in an unfavourable light, and its dependence as much upon incipient tubercles, or congestive inflammation of the lungs, or both, as upon amenorrhœa ought to be inferred. The prognosis in the other associations of suppression, depends as much upon circumstances peculiar to the patient as upon the particular complication present; and requires no further notice than has been taken above (§ 73, 74.).

76. *D.* The *treatment* of the complicated obstruction should be directed with the same intentions as have been already stated. In the acute complications, particularly those with hæmorrhagic, apoplectic, epileptic, and inflammatory seizures, in plethoric habits, general and local bloodletting, emmenagogue cathartics, diaphoretics, &c. are requisite; and when the other complications occur in these habits of body, a similar treatment, especially local bloodletting in the situation above pointed out, should be prescribed, and be aided with the other means already noticed, according to the particular associations observed.

77. In the more chronic complications, the means should be adapted to the peculiarities of such cases, which are too numerous to admit of even a partial notice. The most of those, however, will allow of a trial of the means already advised for delayed and suppressed menstruation; and, although the exact recognition of the complication present should determine the mode of treatment, still that which is more immediately directed to the obstruction should not be neglected. The exhibition of the spirits of turpentine in alterative or purgative doses, according to circumstances; a mild course of mercury, or of iodine, or of both, or of iodine and iron; a recourse to digitalis, conium, stramonium, belladonna, madder, rue, savine, &c., are the most deserving of notice. Where the obstruction is connected with spasmodic or painful disorders, turpentine, iron, stramonium, belladonna, opium, hydrocyanic acid, ammonia, &c., are severally useful. When it is related to chlorosis, chorea, or anæmia, the preparations of iron are particularly indicated, and the aid of aloetic and warm purgatives required.

IV. Difficult Menstruation. — Syn. *Dysmenorrhœa*, Vogel, Sagar. *Dysmenia*, Swediaur. *Menorrhagia difficilis*, *M. Stillatitia*, *Amenorrhœa difficilis*, *Amen. partialis*, Auct. *Paramenia difficilis*, Good. *Menstrua difficilia; M. Dolorosa. Beschwerliche monatliche reinigung*, Germ. *Menstruation difficile*, Fr. *Menstruazione difficile*, Ital. *Painful menstruation.*

78. Defin. — *Menstruation preceded and accompanied by acute pain in the abdomen and hypogastrium, and often in the back or mammæ, the discharge being frequently scanty, or presenting morbid appearances.*

79. This form of uterine disorder is of frequent occurrence, and is not only productive of extreme suffering, but often of very serious consequences. Dr. Ashwell remarks, that it often prevents conception; and, if pregnancy has occurred during its continuance, there is risk of abortion. Although, in itself, it is not a fatal malady, yet malignant diseases have followed its protracted existence; and it is generally very difficult of cure.

80. i. *Causes.*— Both married and single females, the latter more particularly, are liable to it. Dysmenorrhœa may occur in all temperaments and habits of body; but more frequently in women of irritable, hysterical, and nervous temperaments, and of spare, strumous, and phthisical constitutions than in others. It is probably somewhat favoured by indolence and full or rich living. The most common exciting causes are, exposure to cold in any form during menstruation; sudden fright, or shock, or violent mental emotions or disappointed affections, especially when occurring at this period; exposures to cold soon after parturition or abortions, &c. Indeed, the same causes which occasion suppression of the menses, or inflammation of the uterus, may occasion dysmenorrhœa.

81. Difficult menstruation may occur at any period, and is rarely confined to one or two periods. It may be traced back in some cases to the very commencement of the epoch. The *amount* and *character* of the pain may vary much. It may be moderate and last but a few hours each time, or it may be so severe as to amount to extreme torture, and to occasion faintings or severe retchings; and even to render the patient a permanent invalid. The pain may also be *neuralgic* or *inflammatory* in its character. Owing to these variations, dysmenorrhœa has been divided by Dr. Churchill into — 1st. the *neuralgic*; 2d. the *inflammatory*; and 3d. the *mechanical* or *obstructive*. M. Roche has treated of it as *idiopathic* and *symptomatic*, the latter generally depending upon inflammatory action in the uterus. Mad. Boivin and M. Dugés have viewed it as commonly proceeding from inflammation. Dr. Ashwell has arranged the forms of amenorrhœa into — 1st. The *irritable* or *neuralgic.*— 2d. The *plethoric.* — 3d. The *congestive.* — and 4th. The *obstructive.* The chief objection to this division is that the *second* and *third* must be necessarily alike; for, if a plethoric and a congested state of an organ hardly admits of being distinguished from each other, in respect of their physical conditions, how can they be recognised by aid merely of their physiological phenomena? It would be better, therefore, to consider the *second* variety as one of congestion which may sometimes go on to, or be attended by, an inflammatory state of the internal surface of the uterus, which state, however, may also exist in the *first* variety, the neuralgic character however predominating, and distinguishing it.

82. ii. *Description.* — *A. Neuralgic* or *irritable dysmenorrhœa* occurs chiefly in unmarried females, and in the married who have not borne children. Although it may appear at any period of the menstrual age, it is most common about the thirtieth year. It is generally observed in nervous or hysterical and irritable temperaments, and in spare and delicate habits of body. The monthly paroxysms of pain have all the characteristics of

neuralgia. They are often preceded or followed by headache. The pain often commences in the region of the sacrum, and extends around the lower part of the abdomen and down the thighs. The suffering is often very great; in some cases it is constant; in others, it is remittent. As it continues, a forcing or bearing down sensation is occasionally present, and aggravates the distress; and in some instances the torture is so extreme that the patient rolls about on the abdomen, endeavouring to procure ease from pressure; or is afflicted with constant retchings. These sufferings may endure for only a few hours, or they may continue a day or two before the discharge commences. This is usually scanty at first, or in slight gushes; and the quantity varies in different persons, or even in the same person at different periods. It is often altogether scanty, rarely too much. It is frequently natural in appearance; but it is also often pale, or mixed with small clots, or with shreds, or with a bran-like matter. More rarely it contains shreds of membrane, as observed by Morgagni, Denman, Burns, Blundell and others.

83. The cervix uteri undergoes the usual change at this painful period; it becomes swollen and softer, with an increase of heat; and the os uteri is somewhat more open, than in the interval. As the discharge proceeds, the pain subsides gradually, but not so quickly as in the inflammatory variety; and as it disappears, neuralgic pains are sometimes felt in other parts. The pulse is seldom affected during the attack, further than being weaker than usual; and febrile symptoms are rarely observed. In a few cases, the bowels are irregular during the period. Although the health may not suffer in the interval, yet in the severer cases, or when the complaint has been neglected, the patient complains of headaches, of pains in the back, which are increased by standing or walking, and of various disorders of the digestive organs, consequent upon the general impairment of health, arising from protracted sufferings.

84. The membranous shreds passed in some of these cases, evidently consist of plastic lymph thrown out in the cavity of the womb. In a few cases, this substance has been voided nearly entire as moulded upon the internal surface of the uterus, and has given rise to suspicions of pregnancy, its expulsion being attended by violent forcing pains. It is discharged, in some instances during several successive periods, in others only occasionally. Dr. Denman supposed that females could not conceive who voided these membranes; and such is the case in the great majority of instances, although Dr. Blundell and Dr. Churchill believe that conception is possible.

85. *B. Congestive and inflammatory Dysmenorrhœa.* — In some cases the patient complains of lumbar pain, of a sense of weight and of bearing down in the pelvis, for two or three days before the expected return of the menses. Frequent micturition, constipation of the bowels, severe pain in the region of the uterus, restlessness, and violent forcing supervene. The patient is not feverish, but the pulse is often quick and irritable. The skin is generally perspirable. A sense of exhaustion, with anxious, pallid countenance, is usually felt as the affection proceeds. After some hours, or even after a day or two, the attempts to micturate, or the severe forcing pains, extending sometimes through the abdomen, from the loins, hypogastrium, and hips, are followed by the expulsion of coagula, or occasionally of portions of membrane, the discharge being generally scanty, or in irregular gushes, and at intervals sometimes almost colourless. The forcing pains often resemble those of labour, but the suffering is generally more constant than in it. Sometimes the uterine pain is attended by a sensation as if the pelvis contained some foreign body that should come away; and in these cases, considerable masses of coagula, or of albuminous concretions or membrane, have been passed, affording much relief. This congestive form of dysmenorrhœa, when severe or prolonged, is often followed, for some days, or even for the greater part of the interval, by leucorrhœa, which tends further to weaken the patient, and to superinduce more extensive disease.

86. In some females, particularly in the plethoric and in the sanguine temperament, the disorder assumes a more inflammatory form; or the whole frame exhibits more or less of inflammatory or febrile commotion. It usually occurs earlier in life than the neuralgic form, chiefly in the unmarried or in those who have had children. It is commonly caused by cold, particularly when applied to the feet, thighs, and hips, as when seated on cold or damp seats. It may also proceed from some sudden shock or constitutional disturbance; and may assume various grades of severity. In its slightest states, it not infrequently affects plethoric and robust young females from the first menstrual period until marriage.

87. It usually commences with chills or slight rigors, followed by flushing, feverishness and headache, a few days before the appearance of the catamenia; with these the patient complains of pains in the back and hypogastrium, of aching in the limbs and lassitude; of intolerance of light and sound, and fever. The skin is hot, the pulse full and frequent, the bowels constipated, and the mammæ painful and somewhat swollen (Dewees); but the febrile commotion is rarely so high as to cause temporary or night delirium. These symptoms subside as the discharge proceeds, especially when it is abundant. When it is scanty, they often continue in a less degree, or become aggravated for a time as it disappears; but it is generally more abundant in this, than in the other states of the disease. It may be accompanied with the membranous shreds or exudations, as in the other varieties.

88. During the intervals the general health may not be materially affected, although headaches are not infrequent, and leucorrhœa is often constant. The severity of the attacks is not so regular in intensity as in the neuralgic form, and sometimes a period or two elapses with little suffering. On examining per vaginam during the severity of the pains in the congestive or inflammatory states, evidence of engorgement of the uterus is generally furnished, with swelling and increased heat of the cervix uteri; but there is no external tenderness on pressure.

89. All the forms of dysmenorrhœa, when very severe, generally prevent conception; but the slighter degrees of the complaint will not have this effect. In one of the severest and most obstinate cases, for which I have been consulted, the patient had a family after marriage.

90. C. *Obstructive dysmenorrhœa.* — *Dysmenorrhœa from mechanical obstruction* consists of a narrowing or *stricture of some part of the canal of the cervix uteri.* This variety of dysmenorrhœa was noticed by several continental authors of the last century; and was enumerated by M. CAPURON as one of the chief states of the disease; but Dr. MACINTOSH was the first to insist on its frequency and importance; and Drs. CHURCHILL and ASHWELL have directed their attention to it; but they believe that cases of this kind are rare; and that the stricture is only a part of the complaint, and often exerts no influence upon it, inasmuch as the dilatation of the stricture was not, in most of their cases, followed by an alleviation of suffering. It is natural to infer that, if the stricture had been the real cause of the disease, an accumulation of the menstrual fluid would have taken place in the cavity of the uterus; but this appears not to have been the case. Although an infrequent cause of dysmenorrhœa, it is of sufficient importance to determine its existence in all doubtful and obstinate cases.

91. iii. *Diagnosis of Dysmenorrhœa.* — This complaint is readily distinguished; it is only when it is accompanied with the discharge of an albuminous exudation or false membrane moulded within the uterus, resembling the decidual nidamentum of the ovum, that a distinction is required. The duration of the complaint, the state of the menstrual discharge on former occasions, the length of interval from the previous period, and the physical characters of the substance voided, are sufficient to determine the nature of the case. Dr. MONTGOMERY has very accurately described this substance, and has confirmed the account formerly given of it by MORGAGNI. He states that it differs from the true decidua in not being intended to become a medium of nutrition for the ovum; hence it is not furnished with a structure such as would be necessary for this office. It is thin, and unsubstantial in texture; of a dirty white or yellowish colour after the agitation of it in water; and is devoid of the soft, rich and pulpy appearance and vascular colour, and of the numerous foramina for the reception of the nutrient vessels from the uterus, characterising the true decidua; it is also destitute of the little colytedonous sacculi essential to the latter structure. No trace of the transparent membranes of an ovum can be discovered within it or attached to it; and should it happen to come away entire, in the form of a hollow triangular bag, it never contains a duplicature of itself forming an inner pouch or reflex layer, as in the case of the natural decidual envelopes of the ovum.

92. iv. *Complications of Dysmenorrhœa.* — Most of the complications presented by suppressed, is also observed associated with painful, menstruation; and of these, hysteria and disorders of the digestive organs are amongst the most frequent. I have met with instances of a discharge of membranes from the uterus during dysmenorrhœa associated with painful discharges of similar membranes from the intestines, and with the severer forms of hysteria and spinal irritation. Leucorrhœa is an equally common complication with hysteria, and is often only a part of the uterine disorder causing dysmenorrhœa. Neuralgic and other nervous complaints are not infrequently associated with it; but the observations I have offered on the complications of amenorrhœa (§ 71. *et seq.*) are equally applicable to those of dysmenorrhœa.

93. v. *Prognosis.* — Dysmenorrhœa is dangerous only as respects its consequences when neglected, and when it is complicated with some pectoral or other serious disease. Although it be obstinate, severe and prolonged, as long as the general health does not suffer, and no other local malady appears, its chief importance consists in the distress it occasions, and the effect it may have upon the generative function; for, although a female may conceive, who is suffering any of the forms of the malady, even in their severest states, as when attended by the expulsion of albuminous exudations, still this is an infrequent occurrence, sterility being a much more common result. Generally, however, the disease is cured by medical treatment, or by marriage, and child-bearing; and it necessarily disappears at the change of life. The possibility of its being followed, particularly when it continues up to, or past, the fortieth year, by organic, or even by malignant disease of the uterus, especially of the cervix and os uteri, ought not to be overlooked; and this contingency is, perhaps, more likely to occur in the neuralgic than in the inflammatory form. The mechanical state of the disease may be viewed as more unfavourable than the others; as the removal of the stricture is not always attended by a removal of the malady. Dr. MACINTOSH, however, states that he cured twenty-four cases out of twenty-seven, and that of the twenty-four, eleven afterwards had children. This rate of success has not been confirmed by the experience of other physicians.

94. vi. *Pathology.* — The questions most agitated in respect of the nature of dysmenorrhœa are — whether it depends or not solely upon irritation or altered nervous sensibility, or solely upon inflammatory action — whether it is merely neuralgic or entirely inflammatory. That a degree of inflammatory irritation exists in the internal surface of the uterus, even in the neuralgic form of the disease, is proved by the formation and expulsion of a false membrane in many cases of that form. That this membrane is produced by a similar state of inflammatory action to that which sometimes occurs in other mucous surfaces, and gives rise to a similar exudation, is most probable, notwithstanding the absence of general inflammatory phenomena and the neuralgic character of the pain. The absence of these phenomena is evidently owing to the nervous temperament, and disposition to morbid or exalted sensibility, in connection with the state of the vascular system, and probably also to the nature of the more common exciting causes. In these cases, the inflammatory irritation existing in the internal surface of the uterus excites, or is attended by, an inordinate manifestation of morbid sensibility, although it is insufficient to develope general vascular reaction, owing to the general deficiency of blood in the vascular system, and hence the neuralgic character prevails. In those cases which are manifestly congestive or inflammatory, the nervous susceptibility being less, whilst vascular fulness and disposition to encreased action are much greater, these latter conditions are more prominent. That the albuminous exudations, voided in the different varieties of the disease, are the results of states of local action similar to those which sometimes take place in other mucous sur-

faces, may be inferred not only from their similarity of characters, but also from other phenomena, more particularly from the violence of the pain attending their detachment from the surface on which they are formed, as evinced by their formation in the bowels (see art. INTESTINES, § 52.) as in the uterus. In two of the complicated cases alluded to above (§ 92.), one of which was seen also by Sir B. BRODIE and the late Dr. DAVIS, the other by Dr. ASHWELL, in consultation, the albuminous exudation or membrane was voided from both the intestines and uterus, with violent suffering referrible to both these situations, and with severe and obstinate sympathetic disorders of an hysterical and neuralgic nature.

95. vii. *Treatment.* — The *indications of cure* are the same in all the forms of this malady: these are — 1st. *To alleviate the suffering at the menstrual period;* and — 2d. *To restore during the intervals the healthy condition of the organ.*

A. The *first of these intentions* is, however, to be fulfilled by somewhat different means, in the several forms of the disease.

96. *a.* The *neuralgic variety*, as I have already stated (§ 82.), ought not be viewed as being entirely devoid of a local inflammatory character, at least in many cases, or in those attended by the production of an albuminous exudation, because the symptomatic phenomena of inflammation are not manifested. Therefore, unless there be manifest deficiency of blood in the vascular system, leeches should be applied below the groins, as above advised (§ 67.), and be followed by fomentations with hot sponges. After the bleeding has ceased, the warm bath, or warm hip-bath, and the anodynes about to be advised, may be resorted to, and even repeated. Where local bleeding is not indicated, and after it has been employed, opiates, or henbane, or belladonna, or stramonium, conium conjoined with camphor, assafœtida or other antispasmodics, are generally beneficial. I have prescribed the following with advantage: —

No. 293. ℞ Sodæ Biboratis ℈ ij.; Extr. Conii ʒ ss.; Extr. Strammonii (vel Extr. Alcoholici Aconiti) gr. iij.; Pulv. Capsici gr. vj.; Olei Juniperi q. s. *m.* Fiat massa æqualis quam divide in pilulas xviii, è quibus capiat duas, tertiis vel quartis horis, ad tertiam vel quartam vicem.

No. 294. ℞ Pilulæ Galbani Comp. ʒ ss.; Extr. Hyoscyami ℈j.; Sodæ Biboratis, ʒss.; Extr. Belladonnæ, gr. iv.; Olei Juniperi, q. s. *m.* Fiant pilulæ xx. quarum capiat duas, tertiis vel quartis horis.

No. 295. ℞ Camphoræ rasæ ℈ j; tere cum Mucilag. Acaciæ ʒ iij. et adde Aquæ flor. Auranti ℥ vjss.; Sodæ Biboratis ℈ ij.; Spirit. Ætheris Nit. ʒ iij.; Spirit. Juniperi Comp. ʒ iij.; Tinct. Hyoscyami ʒ ij. *m.* Fiat mist. cujus capiat coch. ij. larga, secundis vel tertiis horis.

97. The narcotics just mentioned may be prescribed in the form of *suppository*, or in *enemata;* but they ought not also to be given by the mouth when thus employed, nor should they be prescribed in large doses in enemata, as serious effects may follow. In those cases which are attended by a sensation of a substance pressing down in the pelvis, as if requiring to be brought away, the ergot of rye and the biborate of potash will often afford relief, particularly when there are coagula, or albuminous exudations in the uterus, or passing the cervix. *Injections per vaginam* of the warm decoction of poppies, or of warm water, containing the extract of conium or of hyoscyamus, several times a day; and *hot fomentations* of the same kind over the pubes and hypogastrium will frequently be of service. *Plasters* containing the extract of conium, or of belladonna, or of aconitum, and camphor, may afterwards be placed upon the sacrum, or over the hypogastrium, in the more severe and obstinate cases.

98. *b.* The *congestive and inflammatory states* of dysmenorrhœa require, with very few exceptions, either general or local bleeding, or even both, as early as the attack comes under treatment. Leeches applied to the thighs are preferable to cupping on the loins in these cases; for I have known instances of suppression of the menses caused by the latter. The bleeding, however, should not be too profuse, as it may thereby interfere with the catamenial discharge; it may, however, be repeated at the return of the period according to the peculiarities of the case. After vascular depletions, cooling diaphoretics, conjoined with narcotics, are generally beneficial; particularly the liquor ammoniæ acetatis, with camphor, spiritus ætheris nitrici, and any of the narcotics already noticed. Warm poppy fomentations, the warm bath, and the other means already noticed (§ 97.) will also be frequently of service. The bowels should be kept gently open by means of cooling laxatives.

99. *B. During the intervals* between the menstrual period, the treatment should be varied conformably not only with the varieties above distinguished, but also with the circumstances of the case. — *a. In the neuralgic form,* much attention should be paid to the state of the digestive functions, and to diet and regimen. The biliary secretions ought to be promoted by blue pill, or the hydrarg. cum creta, taken alternate nights; and by a stomachic aperient, the following morning or night. After the abdominal secretions and excretions have been improved, chalybeate preparations or mineral waters may be tried, and be aided by residence in a pure air; by exercise on horseback, or by regular walking exercise, taken moderately, twice or thrice daily; and by warm salt-water baths, followed by cold salt-water bathing or the daily use of shower baths.

100. The several preparations of iron have been advised in this complaint. The iodide of iron is one of the most efficacious. It may be given in the syrup of sarsa. Dr. LOCOCK advises the vinum ferri with the spiritus ætheris sulph. comp. The mistura ferri comp. and the alkaline combinations of iron are also very serviceable. Dr. DEWEES makes favourable mention of the tinctura lyttæ, and more especially of the tinctura guaiaci and tinctura guaiaci ammoniata; and Dr. CHAPMAN advises the decoctum senegæ. Dr. CHURCHILL recommends blisters to the sacrum, or a caustic issue in the same situation. I have prescribed pea issues in the insides of the thighs with success.

101. The more obstinate cases, and those especially which are attended by the expulsion of albuminous exudations, may resist most of the means now mentioned; particularly when the malady is perpetuated by persistence in one of its most common exciting causes, namely, masturbation. In these circumstances, PLUMMER's pill, or the blue pill, may be given, every night, alone or with soap and ipecacuanha, until the gums are affected; or the spirits of turpentine, in the dose of about one drachm, may be taken at night and

upon waking in the morning, on the surface of a cup of milk, or in any other vehicle, for some days before the next menstrual period. Injections *per vaginam*, of warm water containing a little of the biborate of soda, especially when the period of the catamenia approaches; the same substance taken internally, alone or conjoined with any of the more congruous medicines already noticed, or with the supertartrate of potash, when the bowels require to be kept freely open; and warm pediluvia, hip-baths, or the warm bath, continued or repeated according to circumstances, may further be resorted to.

102. *b. In the congestive and inflammatory* states of dysmenorrhœa, spare diet, regular and active exercise, particularly on foot and in the open air, with attention to the state of the bowels, should be especially insisted on. If the case prove obstinate, or continue notwithstanding the more active means advised for the treatment during the menstrual period (§ 98.), it will be necessary to have recourse either to the means already advised for the more severe cases attended by the discharge of albuminous exudations (§ 101.), or to a mild mercurial every night, the supertartrate of potash with biborate of soda being taken in the morning. In some cases of this state of the disease, the iodide of potassium and the liquor potassæ, given in suitable vehicles, have proved efficacious. Of the local application of iodine advised by some recent writers, in some obstinate cases of dysmenorrhœa, I have no experience; and I know of no circumstance that can render it appropriate. On the approach of the next menstrual period, leeches applied below the groins, and the means advised above (§ 101.) should be resorted to. If the bowels be confined, the remedies just mentioned, or the biborate of soda with aloes, may be prescribed. In cases of this kind, as well as in suppression of the menses, Dr. MEAD had great faith in *hellebore* given until a free operation was effected on the bowels.

103. *C.* The *mechanical or obstructive variety of dysmenorrhœa* has been remedied by the introduction of bougies; which, however, require both care and dexterity to prevent injurious consequences. As the removal of the stricture is not necessarily followed by the cure of the complaint, the medical treatment recommended should also be employed according to the circumstances of the case.

V. EXCESSIVE MENSTRUATION. SYNON. — *Menorrhagia* (from *μηνες*, menses, and *ῥηγη*, a rupture); Ῥοος *πολλος*, Hippocrates; *Hæmorrhagia uterina*, *H. uteri*, *Menstrua immodica*, *M. superflua*, Auct. var.; *Metrorrhagia*, Frank; *Hysterrhagia sanguinea*, Swediaur; *Paramenia superflua*, Good; *Menorrhœa*, *perte uterine*, Fr.; *der Mutterblutfluss*, Germ.; *Inordinate or profuse menstruation.*

CLASSIF. — II. CLASS, I. ORDER (*Author*).

104. DEFIN. — *A too abundant or a too frequent return of the uterine discharge.*

105. In the article upon HÆMORRHAGE FROM THE UTERUS, I have treated of "discharges of blood from the uterus occurring independently of the menstrual evacuation;" and have considered them with due reference to the several periods of life and to the various circumstances in which they occur (*see art. referred to* § 220. *et seq.*). I here confine myself to the consideration of excessive or profuse menstruation, as above defined.

106. The quantity of blood discharged from the uterus at each menstrual period has been variously estimated. In temperate climates it varies from four to ten ounces — from five to seven or eight being the usual amount in this country. Less than four may be considered as scanty, and more than nine or ten excessive. That climate influences the quantity of this discharge is extremely probable; but I do not believe that it has this effect nearly to the extent estimated by some writers; for it is impossible to obtain precise information on the subject. Even when the quantity is unusually large, the discharge may take place in a short period, or during a longer time in recurring gushes; or it may continue for a long period, as a slight or moderate drain.

107. Dr. CHURCHILL distinguishes *three forms* of menorrhagia. — 1st. That in which the discharge is of the natural character, but is excessive as respects its quantity, continuance, or frequency of recurrence. — 2d. That in which the discharge is mixed with clots of blood, but is not attended by alteration of the cervix or os uteri. — 3d. That in which there is change in the cervix, or in the size or position of the uterus. This division is not altogether undeserving of adoption; but as the discharge must necessarily present the characters either of the menstrual fluid, or of hæmorrhage, it is preferable to arrange the forms of the disease accordingly, namely, into *true menorrhagia*, and *hæmorrhagic menorrhagia.*

108. i. *Menorrhagia, with a natural state of the Discharge — True Menorrhagia.* — In this variety the discharge is excessive either as to its quantity, its continuance, or the frequency of its recurrence. It may come on suddenly and most abundantly, thus continue for a longer or shorter period, almost cease for some hours, and then return more or less copiously. It may recur or remit in this manner several times or for several days; the excessive discharge assuming this form at each period. Sometimes it commences and proceeds regularly, in an unusually abundant quantity, the period not being much prolonged; but, more frequently, it lasts for a long time, occasionally for a fortnight or even longer, the quantity not being great at any time, but becoming so from its continuance. In other cases, the discharge returns every two or three weeks, without being in an augmented quantity. This last state is not infrequent among unmarried females of a plethoric system, or sanguine temperament, with much activity of the uterine organs.

109. This variety of menorrhagia is often associated with uterine leucorrhœa, which may either precede or follow each recurrence of it. In some cases, also, leucorrhœa only may have been the primary disorder, menorrhagia supervening; whilst, in others, it may have followed this malady. An examination per vaginam furnishes no information, excepting of a negative kind. There are neither heat, nor tenderness, nor swelling, of the os uteri.

110. After repeated returns of menorrhagia, the constitution indicates the debility and loss of blood produced by it; and the patient complains of weakness or aching across the loins and hips; of languor, exhaustion, faintness, tinnitus aurium, giddiness; and of headache, or throbbings in the

temples, or palpitations of the heart. The countenance is pallid, and the lips, tongue, and gums are pale. If the disease continue, these symptoms become aggravated; the stomach and bowels are deranged; pains in the side, particularly the left, are complained of; the face is sallow, and all the indications of anæmia appear. Ultimately ædema of the ancles, anasarca, diarrhœa, convulsions, and various nervous affections may supervene.

111. ii. *Menorrhagia with discharge of pure blood or coagula — Hæmorrhagic Menorrhagia.* — This variety is met with chiefly in married females, of a leucophlegmatic temperament, and in those who have been weakened by disease, or by frequent child-bearing, or by prolonged suckling; and in these circumstances it is generally complicated with leucorrhœa. But a different, and a more acute, or active state of the complaint occasionally is met with, which has been altogether overlooked by Dr. Churchill. I have observed it on several occasions; and it has also been noticed by Dr. Ashwell. This variety of menorrhagia has therefore been properly divided by him into *three states*, viz. the *active*, *passive*, and *congestive*. The first and second of these are generally attended by a natural state of the cervix and os uteri, whilst the third is usually accompanied with some change in the state and position of these parts.

112. *A. Active or Acute Hæmorrhagic Menorrhagia — Inflammatory Menorrhagia.* — This is the least frequent kind of the complaint. It occurs chiefly in robust or plethoric married women, who live fully, or who addict themselves to sexual excesses; but it is also, although more rarely, met with in young, florid, and plethoric unmarried females; and in both classes of patients it may assume, according to the temperament and habit of body, more or less of an inflammatory, or of a spasmodic character. In this state of the complaint, a sense of tension, weight or fulness in the pelvis, is complained of for a day or two before the accession of the discharge. Sometimes there is also a sense of throbbing in the uterus, with pain, swelling or tenderness of the mammæ; and occasionally even pain in the uterine region. The pulse is quickened, and sometimes fuller and stronger than usual; and there are generally headache, costiveness, and sympathetic fever. In the spasmodic state, the pain in the uterine region is more severe, but it occurs only in paroxysms, and is attended by a twisting sensation in the pelvis and lower part of the abdomen; or it recurs after intervals and resembles labour-pains. These pains usually precede for a shorter or longer period the discharge, which is extremely various as to amount and continuance. Sometimes the discharge comes on in gushes, with coagula, and recurs more or less frequently. These generally afford relief, at least for a time, the febrile symptoms subside, and the rest of the period is passed, as in the more healthy state. But, in more severe or protracted cases, after a shorter or longer remission, during which either a draining merely continues, or the discharge is in almost a natural state, an exacerbation, in a more or less severe form, takes place; and thus the complaint may return oftener than once, and be prolonged for seven or eight days or even much longer, especially if the patient attempts to keep about or to use any exertion. On examination per vaginam, the os uteri and cervix, sometimes with the vagina, are often discovered to be fuller, hotter, and more tender than natural. The discharge usually leaves the patient exhausted, and several days elapse before her usual health is restored. This form of the complaint may return during several successive periods, each of which may be so prolonged, that the intervals between them become greatly reduced, and the health remarkably impaired. In these cases, this active form passes into the next, or the passive state of the complaint.

113. *B. Passive or chronic hæmorrhagic menorrhagia* is generally gradual in its accession, unless when it is consequent upon the acute state. It is the most common form of the complaint; and affects chiefly delicate, hysterical, and debilitated females. It exists in various grades from the slightest increase of the menstrual discharge, to the most severe hæmorrhagic prostration. In some cases, the disease at first, or even for several periods, possesses the usual features of true menorrhagia. In other instances, one, two, or more coagula are observed at first upon the accession of the period, and then an intermission takes place. The discharge afterwards recurs more abundantly, and with larger or more numerous clots. It may be so abundant or continue so long as to occasion faintings and great exhaustion; the back being weak and aching, the countenance and lips pallid, the strength exhausted, and the pulse always becoming small, feeble, and quick. The constitutional symptoms and consequences of the malady already noticed (§ 110.) become urgent or even dangerous, if the discharge be not checked or arrested. The uterus, on examination, generally betrays no change.

114. *C. Congestive menorrhagia — Menorrhagia with change in the Uterus.* — This variety generally occurs after forty years of age, or about, or even after, the cessation of the menses. The discharge is generally more profuse, and its effects more severe in this than in the other varieties; and it takes place in all constitutions, temperaments, and habits of body. The attack is usually preceded for some time by irregularity of the menses, as to quantity and time, as well as to the duration of the periods; and uterine leucorrhœa has generally existed during the intervals. About twenty-four hours after the discharge has commenced, large clots are expelled, and the sanguineous flow becomes still more abundant. The attack lasts from six to ten days; but, in cases of longer standing, Dr. Churchill has occasionally known it to continue throughout the interval, and terminate after the next period either gradually or suddenly; but it may continue for several periods with remissions merely during the latter portion of the intervals. The quantity lost, in some instances, has been sufficient, in one attack, to excite fears of a fatal result. The discharge is encreased by standing or exertion, but it is not materially diminished by the recumbent posture. In addition to all the symptoms above noticed (§ 113.), which are occasioned by exhaustion and loss of blood, and which are still more rapidly and severely induced in this than in the preceding varieties, the patient complains of weight, dull pain, or bearing down in the pelvis. There is also occasionally dysuria; but more frequently irritation only extending to the urethra and neck of the bladder. The pulse is weak, small, sometimes quick; and the general

health remarkably impaired. On examination *per vaginam*, the os uteri is generally found low in the vagina, and is directed more backwards, and is more open, than in the healthy state. The cervix uteri is also more swollen, the body of the organ being thrown forwards so as to press upon the bladder. There is no increased heat of the cervix or vagina, but the former is slightly tender on pressure, and the body of the organ seems somewhat swollen.

115. iii. *Diagnosis.— A. As respects the Forms of the Complaint.— a.* The *first form* of the disorder is readily distinguished by the absence of coagula from the separation of the discharge into crassamentum and serum; when such separation takes place, the complaint is no longer true or simple menorrhagia, but one of the hæmorrhagic varieties. — *b.* Of these *varieties*, the *first* is distinguished by slight fever, pain in the region of the uterus, or spasms in this region and in the abdomen, by slight heat and tenderness of the os uteri, and by the other circumstances of its occurrence as pointed out above (§ 112.). — *c.* The *second* of these is not attended by fever or by heat or tenderness of the os uteri; but coagula are voided, and the parts are generally soft or relaxed; nervous, debilitated, and hysterical females being generally affected, and anæmia being either present or soon supervening. — *d.* The *third* or congestive variety is characterised by the state and position of the *cervix* and *os uteri* (§ 114.), especially by fulness of the former and openness of the latter, and by the class of patients in which it most commonly occurs.

116. *B. Menorrhagia* may be mistaken for early abortion, or for organic disease of the uterus. — *a. Approaching abortion* may be confounded with hæmorrhagic menorrhagia until the ovum is expelled or detected; the paroxysms of pain, or recurrence of spasms, attending the spasmodic or inflammatory state of menorrhagia, resembling the pains of abortion. The retention of a blighted or of a detached ovum often gives rise to hæmorrhage, which may be mistaken for menorrhagia; and the retention with its consequences may continue for weeks or even for months, and yet nothing more may be detected on examination beyond greater fulness of the cervix, and more openness, than usual, of the os uteri. In these the history of the case, the continuance and symptoms of the complaint, and the effects produced by the discharge, will suggest its probable cause; and the adoption of the means about to be recommended will disclose the nature of, as well as terminate, the mischief. I have been consulted in several cases similar to the following: — The wife of a friend had passed the usual menstrual period a few days when she was attacked by pains, of a spasmodic nature, in the region of the uterus, followed by menorrhagia, which subsided upon assuming the recumbent posture. The discharge recurred, sometimes in gushes, after more or less marked remissions, being generally preceded by pain. Cupping, leeches, anodynes, &c. were prescribed by the surgeon, who usually attended her during her confinements. The discharge continued, and the consequences becoming serious, I was requested to see her. The ergot of rye was prescribed with the biborate of soda, an early ovum was expelled, and the recovery was afterwards rapid. The active form of hæmorrhagic menorrhagia very closely approximates to inflammatory determination to, or even to inflammation of, the uterus; and is to be distinguished from it by the severity and continuance of the pain, and by general fever being greater in the latter, the discharge preventing the former from passing into an acute state of inflammation.

117. *b.* The difficulty of distinguishing between hæmorrhagic menorrhagia and hæmorrhage caused by organic disease of the uterus, is often very great. In these latter the hæmorrhage is irregular, and occurs at any time, and without regard to the menstrual period, when it takes place so early in life; it is, moreover, attended by more pain than menorrhagia, and by various constitutional indications of malignant or other structural change. Corroding ulcer or cauliform excrescence of the os uteri, polypus when it has descended even partially, and ulcerated cancer of the cervix, are readily recognised on examination, when they occasion frequently recurring or protracted hæmorrhage; but whether the discharge is caused by uterine congestion and relaxation merely, or by a polypus retained in the uterine cavity, or by a sub-mucous tumour, or by organic change of the mucous lining itself, is difficult to determine. A favourable diagnosis depends on the natural state of the uterus as far as may be determined by examination, on the absence of great emaciation, on the diminution of the hæmorrhage from treatment, on the general concurrence of the discharge with the menstrual periods, on the states of the cervix and os uteri during the intervals, and on the appearances of the countenance. A strumous constitution, as Dr. ASHWELL remarks, glandular tumours in other parts, hard tumours of the fundus or body of the uterus, broad ligaments or ovaries, increasing hæmorrhages and uterine pain, a gradual deterioration of the constitution, and the inefficacy of remedies indicate the dependence of the discharge upon organic lesion, and an unfavourable termination.

118. iv. The *prognosis* depends upon the evidence furnished as to the existence or non-existence of organic lesion. As long as the complaint presents either of the forms of menorrhagia above described, the menstrual periods being observed, if the intervals or remissions are marked accordingly, if there be no sensible change in the uterus, if the lungs are unaffected, and the general health not remarkably impaired, a favourable prognosis may be given. The *first* variety, and active form of the *second*, are more readily removed than the other states of the complaint. The slighter cases of these may even cease spontaneously; but the congestive form is generally more obstinate and severe. In the severer cases, *pregnancy* does not take place; but in the milder cases it may. When the disease assumes a more severe, chronic, and continued form, causing anæmia, nervous affections, and the more serious consequences, above alluded to (§§ 110. 113.), it is not altogether devoid of danger, and a guarded prognosis then is requisite. The circumstance of menorrhagia, when neglected or unsuccessfully treated, being not infrequently a cause of pulmonary disease, should not be overlooked.

119. v. *Causes.— a.* The *predisposing causes* of menorrhagia are, the hæmorrhagic diathesis and hereditary predisposition, the earliest and latest periods of the menstrual epoch, a delicate or de-

bilitated constitution, general or local vascular fulness, and excitability of the uterine system. Several causes both *predispose* to, and directly *excite* the complaint, particularly venereal excesses, masturbation; prolonged or too frequent suckling; leucorrhœa; indolence, rich living, and hot beds; spirituous and other liquors used in excess; frequent child-bearing and abortions.

120. *b.* The other *exciting causes* are local injuries, falls, concussions of the trunk and pelvis as when falling on the hips; the use of irritating and exciting purgatives, particularly calomel, aloes, and colocynth; constipation of the bowels; the irritation of worms in the intestines; physical efforts, as lifting heavy weights; exposures to cold, and mental excitement and moral emotions. It is very manifest that these and other influences will often directly or indirectly occasion increased vascular action in the uterus, or produce increased fulness of, or flow of blood into, the uterine vessels, although the vascular system may not be plethoric, or even may actually be deficient in its due supply of blood. In many instances, the sanguineous discharge proves a natural relief to the organ, which, without such relief, may have become the seat of very acute inflammatory action.

121. vi. *Treatment.*—*A.* The treatment of the *first variety*, or true menorrhagia, should depend much upon the *habit of body* of the patient, *the period* at which it is prescribed, and upon *the causes* of the complaint. The causes should be ascertained, and removed, as far as this may be done. —*a.* When the patient is robust or plethoric, a copious discharge is often salutary, and should not be prematurely interfered with, or should be allowed to proceed until it ceases spontaneously. Most writers advise general and local bloodletting, cupping on the loins or sacrum, &c., and, in some cases, these depletions are both indicated and beneficial, but they are as often unnecessary, and in a few instances they have proved injurious, by suddenly arresting the discharge, which has not returned again in a regular or healthy form; or by giving rise to various hysterical affections, particularly when the states of general or of local plethora have not been such as to require them. In some cases, dry-cupping on the loins, or the application of leeches around the anus, is more appropriate and beneficial than these measures.

122. *b.* When the discharge is really excessive, especially in respect of the state of the patient, and in the *delicate*, *pallid*, and *hysterical*, the patient should maintain the recumbent posture on a sofa or mattrass, be restricted to a spare diet and cooling regimen, and take cooling astringents, as the infusion of roses with sulphuric acid, or the infusion of cinchona or other astringent infusions with nitre. If the bowels be confined, the supertartrate or tartrate of potash may be given with the preparations of senna, or the sulphate or bisulphate of potash in the infusion of roses. In other circumstances, the acetate of lead with the acetate of morphia, or the sulphate of zinc, with opium; or camphor and ipecacuanha with opium; or repeated doses of Dover's powder, will be prescribed with advantage. The ergot of rye has been very generally recommended in menorrhagia. Dr. Churchill, Dr. Ashwell, and others, advise it in this form of menorrhagia in doses of about five grains, three times a day. It is often efficacious, but less frequently so in this, than in the hæmorrhagic forms of the complaint. Cold sponging the loins, abdomen and hips, and cold enemata, may be employed; but injections of cold, astringent fluids into the vagina, as directed by Dewees and some French physicians, are not unattended by hazard, especially in suddenly checking the discharge, and thereby risking the occurrence of inflammation and internal effusion. Plugging the vagina, as advised by some writers, or an enema containing a scruple of the acetate of lead, as prescribed by Dr. Macintosh, is rarely requisite in this variety of the complaint.

123. *c.* In the *intervals* between the periods, strict reference should be had to the state of the patient. For the *plethoric* and robust, a spare and cooling diet, the bowels being kept open by means of the aperients above recommended (§ 122.), regular exercise in the open air, early rising, and the avoidance of heating beverages and of too warm apartments, or too soft and warm beds, of full living, luxurious indulgences, and of the predisposing and exciting causes, are especially required.

124. *d.* For the *pallid* and *delicate*, different means are necessary. To this class of patients, the chalybeates, particularly the tincture of the sesquichloride of iron, or the sulphate of iron with quinine and sulphuric acid, are especially appropriate. The chalybeate mineral waters, residence near the sea, or in a dry and airy situation, sponging the loins daily with cold salt water, or with a solution of bay-salt; salt water bathing, or the cold shower-bath; avoidance of the causes, as prolonged or excessive suckling; abstaining from, or moderation in, sexual intercourse; the use of enemata of cold water; and a light nutritious diet, with attention to the state of the bowels, are also requisite. Wine may be taken in small quantity; and the extremities and surface should be kept moderately warm, but too much clothing around the loins and hips is injurious.

125. *B.* The *second* or *hæmorrhagic variety* of the complaint should be treated on the same principles as have been stated above.—*a.* During the *acute* or *inflammatory form of the attack*, bleeding, general or local, or both, is more appropriate than in simple menorrhagia. This form of the complaint, as I have remarked, approaches to metritis, into which it would readily pass if the discharge did not occasion a resolution of the morbidly increased vascular action in, or determination to, the womb. The cases, however, are comparatively few, in which the disease nearly reaches this state; but in these, depletions, according to the state of the pulse; cooling aperients and diaphoretics; the preparations of antimony conjoined with sedatives; the acetate of lead with acetate or morphia; ipecacuanha with opium, or Dover's powder, are principally indicated. Dr. Ashwell states, that Dr. Cholmely prescribed drastic purges for all cases of acute hæmorrhagic menorrhagia that came under his care in Guy's Hospital—a practice doubtless attended by success in the great majority of instances, owing to its derivative operation; but, if these purgatives had acted much on the lower bowels, the uterus may have participated in the irritation and consequent vascular determination.

126. When the acute form of hæmorrhagic menorrhagia is attended by much *pain* or *spasm*, or by recurrences, or by exacerbations of either of these, ipecacuanha with opium, in frequent doses;

digitalis with camphor and belladonna, and a plaster applied over the sacrum containing the extract of belladonna, are generally beneficial. If there be any reason to infer that the discharge and pain are perpetuated by the retention of an early detached or blighted ovum, the biborate of soda may be given in solution either alone or with the tincture or powder of the ergot; or an enema may be administered containing the spirits of turpentine and the extract or confection of rue; and an epithem or embrocation with turpentine, or with some one of the liniments in the *Appendix* (F. 297. 311.), may be placed over the hypogastrium. In these cases, about half an ounce of turpentine may be taken by the mouth, with an equal quantity of castor oil, either on the surface of milk or in any suitable vehicle, and may even be repeated, particularly when the discharge continues, or resists the other means which have been here advised; the enema just prescribed being also repeated in these circumstances.

127. During the intervals, the treatment of this form of hæmorrhagic menorrhagia should be in no respects different from that advised for simple menorrhagia in plethoric habits. In many cases, it should be conducted with the conviction, that more or less local congestion or vascular determination continues during the interval; and, consequently, a cooling regimen, spare diet, occasional local depletions, refrigerants, cooling aperients, and avoidance of the causes, should be recommended.

128. *b.* The *passive* or *chronic state* of hæmorrhagic menorrhagia should be treated, when the disease is not severe, nearly as advised for simple menorrhagia occurring in delicate females. In this state of the complaint the ergot is especially useful, and it may be conjoined with the biborate of soda; or the latter may be given with vegetable tonics, astringents, and aromatics. In the more severe or obstinate cases, the means just advised (§ 126.), or those prescribed for HÆMORRHAGE FROM THE UTERUS (247. *et seq.*), must be resorted to. The cold douche on the loins and hips; cold astringent enemata, or terebinthinate enemata; terebinthinate epithems, or embrocations on the hypogastrium; the recumbent posture and perfect quietude are also beneficial. Dr. BLUNDELL resorts "to the injection of astringents, not into the vagina only, but into the uterus itself," in cases where the bleeding goes on until the patient is reduced to extreme weakness. In these, the more astringent tonics and mineral acids, the tinctura ferri sesquichloridi, with tinctura lyttæ, in the infusion of quassia or calumba; the bi-sulphate of potash in the infusion of roses, with tincture of henbane, when the bowels are confined; and, subsequently, the vinum ferri, or other chalybeates, a moderate use of wine and light nutritious food, residence on the sea-coast, or in a dry air, and the use of the mineral waters recommended for convalescence from HÆMORRHAGE (§ 251.), and the other means advised above (§ 123.), during the intervals of simple menorrhagia, are generally appropriate.

129. *c.* The *third form* of hæmorrhagic menorrhagia requires but slight modifications, if any, of the treatment already stated. Previous to the recurrence or exacerbation of an attack, and when there is evidence of local congestion, the system not being much reduced, cupping on the loins, or leeches in the vicinity of the anus may be prescribed; the causes of the complaint, particularly local excitements, sexual intercourse, &c., being avoided. In this state of disorder tonic astringents are required, even at the time when local depletions are indicated; and when these latter should not be resorted to, dry cupping on the loins may be directed. In this form, as well as in the preceding, the ergot of rye will generally prove efficacious; and the several means just recommended for passive menorrhagia (§ 128.) will also be of service in this. If the cervix or body of the uterus be enlarged, the preparations of iodine, especially the iodide of iron or of mercury, or the iodide of potassium and liquor potassæ, the iodide and other preparations of arsenic, and blisters repeatedly applied over the sacrum, or kept open for some time, or other counter-irritants in the same situation, will generally prove beneficial. The other means already directed for the preceding states of menorrhagia, during the period and intervals, may also be resorted to in this, more particularly the astringent and terebinthinate enemata, and terebinthinate epithems applied over the hypogastrium. If this form of menorrhagia be dependent upon organic change in the uterus, the treatment should be mainly directed to such change. (See art. UTERUS.). When menorrhagia assumes those severe and even extreme forms which are truly hæmorrhagic, the observations which have been made at due length on the *pathology and treatment of hæmorrhagia from the uterus*, are altogether applicable to it. (See art. HÆMORRHAGE, § 220, *et seq.*)

VI. OF CERTAIN IRREGULARITIES OF MENSTRUATION NOT COMPRISED UNDER THE FOREGOING HEADS.

130. I have elsewhere stated that menstruation may take place *prematurely*, and that when the discharge appears irregularly, or only occasionally at an earlier age than that which has been assigned above to the commencement of the menstrual epoch, it should be often viewed as hæmorrhage from the uterus or genitals, rather than early menstruation. On this subject I shall, therefore, add nothing at this place to what I have said in the article HÆMORRHAGE (see § 222.).

131. i. *Irregular Menstruation and its Complications.* — *A.* In some instances the menses are *premature*, but they afterwards cease, and again recur, sometimes profusely, after *irregular* and *prolonged periods.* In other cases they are *delayed*, then appear for a few periods, either *scantily* or *profusely*, and thus return after irregular or prolonged intervals. In many cases, these irregular states are *complicated with leucorrhœa*, and if this association be allowed to proceed, *chlorosis* or *tubercular disease of the lungs* may supervene, and place the life of the patient in the greatest jeopardy. They may also occur in connection with *chorea*, especially scanty and irregular menstruation, but not so often as *delayed menstruation*, which generally exists when chorea continues up to puberty. In young females, particularly in the scrofulous and delicate, these irregularities, especially when they are connected with delayed menstruation, are sometimes *associated with enlargement or chronic inflammation of the lymphatic, parotid, and sub-maxillary glands.* I have been consulted in several instances on account of glandular enlargement in various situations, particularly of the

glands just mentioned, which had commenced about the period of puberty; and in all these the catamenia had been delayed, or had appeared scantily, and at long intervals. These cases occur chiefly in large boarding-schools, where too many sleep in one apartment, and where due exercise in the open air is neglected. They are frequent also in factories, in which females about the period of incipient puberty are employed. At this period, and also in connection with delayed or scanty menstruation, the slighter forms of *goitre* are not infrequent, especially where this latter disease is endemic.

132. These irregularities, as to the time and abundance of the catamenia, are often also associated with the earlier periods of *tubercular consumption*, with general *cachexia*, and with the slighter forms of *chlorosis;* complete amenorrhœa more frequently accompanying the advanced state of this latter complaint. In these cases, tubercular disease of the lungs is a frequent termination of the malady.

133. *B. Treatment.* — For these *irregular* and *complicated* states of menstruation, there is no remedy so much to be depended upon as *iodine*, in judicious combinations, particularly when aided by change of air, residence on the sea-coast, salt-water bathing, chalybeate mineral waters, and walking exercise, or riding on horse-back. The iodine may be combined with *iron*, the liquor potassæ, or other substances, according to the features of the case. The preparations of iron, particularly the mistura ferri composita, and emmenagogue and stomachic purgatives, are also indicated. If *leucorrhœa* exist, the means advised for that complaint may be prescribed, or the above treatment varied accordingly. In the summer of 1826, I was requested by Mr. Annesley to see Miss C., aged sixteen years, who had the parotids, sub-maxillary glands, and the lymphatic glands in the neck, near the clavicles, and in the axilla remarkably enlarged, and in a state of chronic inflammation; the integuments, however, had not become discoloured: the catamenia had not appeared. I advised a course of iodine in combination with liquor potassæ, and afterwards with iron, and persistence in the use of these for some months in small or moderate doses, the catamenia appeared at first scantily and irregularly, and the glandular disease gradually disappeared without proceeding to suppuration. Several cases of a similar description have occurred to me in the circumstances alluded to. These several forms of scanty and irregular menstruation, especially those with prolonged intervals between the periods, require much the same treatment as was advised for amenorrhœa in delicate constitutions (§ 32—38.).

134. ii. *Offensive or otherwise morbid catamenia* are occasionally observed; and especially in the same circumstances as I have mentioned in connection with the production of the foregoing irregularity. — *A.* The discharge may not only be very offensive, but also discoloured and remarkably irritating to the parts with which it comes in contact. I was many years ago called to a young lady, about seventeen years of age, in a boarding-school, who was suffering in a distressing manner in consequence of the irritating and offensive state of the catamenia. There had been no retention of the discharge, but it was so irritating as to inflame the vagina, the labia, and insides of the thighs; severe erythema extending along the limbs and for a considerable distance over the hips, and confining her for several days to bed. She had suffered in a much less severe manner in some of the preceding menstrual periods. I have since met with instances of this state of the catamenia being complicated, or otherwise connected, with *erysipelas.* These conditions did not appear to have been caused by retention of the discharge in the vagina, as no obstruction existed, and there was no other symptom of menstrual disorder. Dr. Blundell, however, makes mention of partial closing of the orifice of the vagina, as being, in rare instances, a cause of offensive catamenia. In the cases to which I have here directed attention, the catamenia are offensive, owing, generally, at least as I have observed, to constitutional disorder, or to a morbid state of the circulating fluids, in connection with impaired action of the principal organs of depuration. Besides this state, in which the discharge is generally also very dark, black, or pitchy, or greenish-black and very offensive, and besides the presence in it of membranous exudations, as described above (§ 84.), it sometimes is grumous, at other times pale, or serous. These conditions of the menstrual discharge may be preceded or followed by leucorrhœa, or be associated with general cachexia, or connected with erysipelas. In one case, this offensive and pitchy condition of the menses proved critical at an early period of erysipelas in the face, in a female of eighteen years of age.

135. *B.* The *treatment* of these states of disordered menstruation, depends much upon the affections with which they are associated. In most of those which I have observed, the functions of the liver, bowels, and skin, were impaired; and the patients were placed in unfavourable circumstances in respect of air and exercise, and had neglected the state of their bowels. In these, stomachic purgatives, tonics with alkalies, emmenagogues and alteratives, were prescribed with complete success; and were continued during the intervals of indisposition, aided by change of air, exercise, the use of alkaline or chalybeate mineral waters, sea-bathing, &c. In these cases, attention to the state of the general health, and to the assimilating and excreting functions, is the chief indication of cure. The articles on Catalepsy and Ecstasy, Chlorosis, Chorea, Hæmorrhage from the Uterus, Hysteric Affections, Leucorrhœa, Ovaria, and Uterus, may be consulted in connection with disordered Menstruation.

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MENTAGRA. See SYCOSIS.

MESENTERY AND ITS GLANDS.—That portion of the *peritoneum* forming the *mesentery* is less frequently the seat of disease than that which is reflected over the digestive canal and other viscera, more especially of inflammatory diseases and their consequences. The *mesenteric* or *lacteal glands* are liable to the same changes as the *lymphatic glands*; but the diseases of the former are generally more dangerous in their consequences than those of the latter. As the mesentery and its glands are portions only of two kinds of structure which are fully discussed in other articles, I shall consider only those changes of them, which, owing to their pathological relations, and to the phenomena they occasion, require a special notice.

I. MESENTERY — INFLAMMATIONS OF. — SYNON. *Mesenteritis*; *Mesenterite*, Fr.; *die Gekrösenentzündung*, Germ.

CLASSIF. — III. CLASS, I. ORDER (*Author*).

2. DEFIN. — *Pain, deep-seated, and extending from the spine to the umbilicus, increased by pressure, cough, &c., attended by symptomatic fever.*

3. i. *Symptoms and Diagnosis.* — The existence of mesenteritis is determined with great difficulty; for, as FRANK observes, it is seldom observed in an uncomplicated form, but generally associated with enteritis. It also sometimes is complicated with peritonitis, nephritis, or even with pancreatitis; and it generally escapes detection until disclosed by post mortem examinations. Mesenteritis very rarely occurs in an *acute*, *primary*, and *simple form*; but more frequently in a *chronic*, *secondary*, and *complicated* state. — *A.* The *acute form* of the disease is indicated by a constant deep-seated pain; extending to the spine and umbilicus; increased by cough, sudden motion of the trunk, by sneezing, and pressure; and attended by a sense of heat, by constipation, vomiting, and by fulness and hardness of the abdomen. In some instances, the hardness is unequal, and occasionally ischuria is present, particularly in children. The accompanying fever is generally inflammatory.

4. *B.* The *chronic state* of mesenteritis is not infrequent, either in a simple or tubercular form; but is usually *consequent* upon, or *complicated* with, scrofulous inflammation or enlargement of the mesenteric glands, with chronic peritonitis or pancreatitis, or with other diseases of adjoining viscera. In its tubercular form it is always associated with tubercular peritonitis, of which it is merely an extension. It is hence hardly or never to be distinguished from those maladies, even when most prominently marked, or is very rarely suspected to exist until disclosed by a post mortem examination; and its symptoms are even more obscure than those of the acute, the obscurity being great in proportion to the complexity and prolonged duration of the disease.

5. *C.* Chronic as well as acute mesenteritis

is met with chiefly in children of a strumous diathesis, and is *caused* by the maladies already noticed, by chronic dysentery, by diseases of the spinal column, by inflammation of the psoæ muscles, by enteritis, and by aneurisms of the aorta. The predisposing and exciting causes of both the acute and chronic forms are, therefore, those which commonly occasion those maladies, particularly *peritonitis.*

6. *D.* The *consequences* of mesenteritis are enlargement, inflammation, or induration of the chyliferous glands; albuminous exudations on, and adhesions of, the opposite surfaces; effusions of serous, or sero-albuminous, or sero-puriform matters from the inflamed surface; purulent collections between the laminæ of the peritoneum forming the mesentery, and the other lesions described in the article Peritoneum.

7. ii. The *treatment* of mesenteritis is the same as that advised for *peritonitis,* due regard being had to the activity or form of the disease, the causes which produced it, and the constitution of the patient, especially the scrofulous, when that is clearly evinced (see art. Peritoneum).

II. Disease of the Glands of the Mesentery.

— Synon. *Mesenteric Disease; Tabes Mesenterica; Mesenteritis Chronica; Marasmus,* Auctorum. *Atrophia Mesenterica, Atr. Infantilis,* Hoffmann. *Febris Hectica Infantum,* Sydenham. *Scrofula Mesenterica,* Sauvages. *Pædatrophia Glandularis,* Swediaur. *Tabes Scrofulosa,* Cullen. *Parabysma Mesentericum,* Good. *Physconia Mesenterica,* Beaumes and Sauvages. *Marasmus Infantilis; Tabes Infantum; T. Atrophica; Pædatrophia,* Auct. var. *Carreau, Atrophie Mésentérique, Entero-Mésentérique,* Fr. *Darrsucht der Kinder; Geröschwindsucht, Atrophie der Kinder,* Germ. *Atrofia,* Ital. *Mesenteric Decline; Atrophy; Mesenteric Fever; Tubercles of the Mesentery.*

Classif. — IV. Class, I. Order (*Author*).

8. Defin. *Distended and enlarged abdomen; emaciation gradually increasing; irregular and otherwise disordered bowels, and ultimately hectic fever, from enlargement and disease of the mesenteric glands.*

9. Of the numerous designations imposed on the malady about to be considered, *tabes mesenterica, disease of the glands of the mesentery,* and *marasmus or atrophy from diseased mesenteric glands,* are the most generally applicable. Sauvages, and recently Dr. Joy, have considered *scrofula mesenterica* to be most appropriate; but, although enlargement or other disease of the mesenteric glands occurs most frequently in scrofulous constitutions, it is not confined to them. The appellation, *infantile,* is equally objectionable; for, although the disease is most common in children, the disease is not confined to them, or to any age. The term *entero-mésentérique* has been applied to it, on the supposition, that the affection of the glands is always consequent upon, or connected with, irritation or disease of the mucous surface of the intestines. Doubtless such is the case in the great majority of instances, but not universally; for, as in the lymphatic glands in various situations, especially as observed in scrofulous constitutions, so in the mesenteric glands, disease may occur primarily and independently of inflammation or irritation in parts related to them.

10. i. Acute Disease of the Mesenteric Glands. — An acute form of disease of the mesenteric glands has been observed but rarely or never unconnected with some other disease, particularly *fever* and *dysentery.* Baglivi noticed this connection in the fevers occurring in Rome; and MM. Petit and Serres described the association as they observed it in the fever which was epidemic in Paris during 1811, 1812, and 1813. Still more recently MM. Chomel, Louis, Andral, and Cruveilhier, have noticed an inflammatory, or rather a congested and enlarged state of these glands, in many cases of fever, when the internal surface of the bowels was inflamed or ulcerated. I have seen the same association of disease in adynamic fevers, both in temperate and in tropical climates, and not only in these fevers, but also in dysentery. That the affection of the mesenteric glands is merely a complication contingent upon irritation of the intestinal mucous surface and glands in these maladies, and is much more frequently met with in some epidemics, and in certain localities, than in others, cannot be disputed; but it has no claims to be considered as a "simple acute inflammation of the mesenteric glands," as some authors have considered it; for it occurs chiefly in connection with marked asthenia or depression of the powers of life; and is indicated merely by enlargement and increased vascularity — changes consequent upon irritation or congestion more frequently than upon actual inflammation.

11. Acute disease of the mesenteric glands can therefore be viewed only as *consecutive* or *symptomatic,* chiefly of the maladies just mentioned. As a primary affection I have had no knowledge of it, and, as such, I believe it rarely to exist. In its symptomatic states I have observed it often, both in children and in adults, but in the former most frequently, and only in post-mortem examinations. Although there are numerous circumstances which have induced me to infer that the mesenteric glands had become affected in the course of dysentery and the enteric form of continued or remittent fever, yet there are no symptoms by which its existence can be known with any certainty. When we observe these diseases affecting the strumous diathesis, and persons residing in low, humid, or crowded and unhealthy localities, and in ill-ventilated streets and apartments, particularly children so circumstanced; when the stools are irregular, lienteric, or chalky, or yeasty, very light, or variously coloured; and when the abdomen is enlarged, and emaciation rapid, there is some reason to suspect acute enlargement or congestion of the mesenteric glands. In these cases the abdomen is often hard, or tense, or tympanitic, but this is occasioned less by the enlargement of the glands than by concomitant flatulent distension of the bowels, as shown by percussion, and by the comparatively little swelling of the abdomen, which is often produced by this state of the glands alone.

12. ii. Chronic Disease of the Mesenteric Glands. — Chronic changes in these glands may occur at any period of life, but much more frequent during childhood, than at any other epoch. That these changes are generally tubercular, and occur in the scrofulous diathesis cannot be doubted; but instances occasionally present themselves of *induration* and *enlargement* of these glands, without any proof of tubercular degeneration, and

evidently produced by either chronic inflammatory action, or irritation in them, generally consequent upon irritation of the intestinal mucous surface; but of these further notice will be taken in the sequel.

13. iii. CAUSES. — *a.* The *predisposing causes* of mesenteric decline are, the scrofulous diathesis, a delicate conformation and weakness of the digestive organs; the epochs of infancy and childhood, especially the period intervening between the commencement of the first dentition and the completion of the second; inappropriate, unwholesome, and insufficient food; exposure to cold, and residence in low, cold, and humid localities. From the undoubted scrofulous nature of the disease, in the great majority of instances, the predisposing causes of scrofula are to a great extent influential in producing it. Although the scrofulous nature of tabes mesenterica has been denied by a few writers, yet the frequent dependence of the latter upon the former has been so fully shown by GUY-DE-CHAULIAC, RIOLANUS, MORGAGNI, PORTAL, CULLEN, BICHAT, MECKEL, A. COOPER, BAILLIE, CHEYNE, JOY, and others, that it can no longer be doubted. Indeed, the frequent appearances of tubercles in the lungs, cervical and bronchial glands, and in the mesentery, either in various states of succession or coetaneously, is a proof of intimate connection between both maladies, if not of the dependence of the mesenteric disease upon the strumous diathesis. Nevertheless, congestion, enlargement, chronic inflammation and its consequences, are met with in these glands, independently of the scrofulous taint, and consequent merely upon chronic irritation of the intestinal mucous surface, whilst in other cases, tubercular change in the mesenteric glands may be the only manifestation of this taint, although this is rarely the case, as signs of it are generally also evinced in other parts of the body, or in the general conformation.

14. The disease may occur at any age, even as early as the period of birth; and it not infrequently appears soon after birth, particularly in infants brought up by hand, and deprived of the warmth of the mother's bosom; and in those which are suckled by unhealthy, consumptive, or debilitated nurses, or by nurses who have suckled for too long a period. It commences more frequently soon after weaning than at any other time, evidently owing to incongruous or inappropriate food. Residence in close, crowded, cold, and damp situations, without due exposure to the light and rays of the sun; insufficient or unwholesome nourishment; a want of requisite exercise in the open air; inadequate clothing and want of cleanliness; sleeping in crowded and ill-ventilated chambers, and with insufficient protection from cold or the night air, are not infrequent predisposing causes, but are also influential *existing causes*, of the disease. Indeed, in the majority of cases, improper or insufficient feeding, and deprivation of pure air, are of themselves the chief, if not the only, causes of the malady.

15. *b.* The *exciting Causes.* — Besides these, over-feeding and incongruous articles of food are amongst the most common causes of mesenteric disease. These articles, not being sufficiently digested, irritate the intestinal mucous surface, and the irritation is propagated thence to the glands. Moreover, the chyle formed from them is either imperfectly elaborated, or retains irritating properties, tending directly to excite these glands, and consequently to inflame, congest, or enlarge them. All derangements of the digestive organs, and particularly of the bowels, when neglected or prolonged, especially when affecting children predisposed by the influence of any of the above causes, or naturally delicate, or debilitated by previous disease, may induce lesions of the mesenteric glands, the liability to such lesions being great in proportion to the amount of debility, and to the extent to which a scrofulous taint, original or acquired, may exist.

16. Mesenteric disease sometimes occurs consecutively upon prolonged gastro-enteric inflammation or irritation, upon chronic diarrhœa and dysentery, upon periodic fevers, and especially upon the remittent fever of children, with either of which it may thus become complicated. In both temperate and warm climates, especially in scrofulous constitutions, chronic inflammation, enlargement, induration, and tubercles of the mesenteric glands are not infrequently found, in *post mortem* examinations of these diseases. In some cases, the changes in the glands are owing as much to the treatment of these maladies, as to the gastro-enteric irritation primarily attending them. Excessive purging, the use of drastic medicines, and of stimulating or irritating substances, cannot fail of often occasioning, or of perpetuating where it previously existed, inflammatory irritation of the intestinal mucous surface, which will sometimes be followed by the alterations of the glands now mentioned.

17. iv. SYMPTOMS. — Dr. JOY divides the disease into *two periods.* — 1. That in which tubercles exist, in an indolent state, without having produced irritation in the glands in which they are imbedded, or in the surrounding cellular substance. — 2. That in which the processes of softening and suppuration are going forward. But, as he justly admits, the first period is attended by no symptoms by which the existence of disease of these glands can be inferred, except in the case which very rarely occurs, of these being so much enlarged at this period as to be detected by touch. Indeed, the only disorder that is observable at this period is referrible chiefly to debility, and to the gastro-intestinal surface, and occasionally also to the liver; the mesenteric disease generally originating in these, coexisting with them, and often not manifesting itself until it is very far advanced, or gone on to irremediable disorganisation. Cases are continually presenting themselves of the disease having proceeded even to the second stage without its presence having been suspected; and instances are recorded by MORGAGNI, BAYLE, and others, in which the mesenteric glands were in a state of suppuration; and yet the patients, who had died of some intercurrent malady, were in good condition.

18. GARDIEN and RAIMANN divide the disease into three stages: — The *first,* or premonitory, which is characterised by languor, debility, pallor, abdominal distension and flatulence, and by disorder of the stomach and bowels: — the *second,* by emaciation, by fetid, and sometimes white stools, by hectic fever, and occasionally by enlargement of the cervical glands, and irregular hardness of the abdomen, caused by the diseased mesenteric glands: — the *third,* by colliquative

sweats or diarrhœa, by slight chills or rigors, by extreme emaciation; by a weak, small, and very frequent pulse, and all the phenomena of confirmed hectic; and by varied, offensive, and lienteric evacuations.

19. It is very obvious to those who have frequently observed this malady, that all divisions of its course are arbitrary. When its uncertain commencement, its consecutive or secondary nature, and its complications and constitutional effects are considered, the attempt, not only to divide its progress into precise periods, but also to describe its phenomena with unerring accuracy, must be altogether futile. To impose an air of constancy on what is always changing is only to mislead, and is calculated to generate a dangerous confidence where a cautious diffidence only ought to be entertained. In these circumstances — in this disease more especially, which is generally the consequence of antecedent disorder, is merely a portion of that continued chain of morbid action, commencing in faulty organisation, or in functional disorder, and terminating in organic change — we should content ourselves with ascertaining and stating those phenomena which most commonly attend it, with marking their more common procession, and with cautioning the inexperienced, that, although these phenomena are commonly present, they are not invariably or universally remarked, and that they are variously grouped, and associated with other symptoms, according to the circumstances of individual cases, and to the complications of, or changes produced by, the disease.

20. *a.* Most of the *early symptoms* are referrible chiefly to debility, manifested principally in the digestive organs, and to asthenic inflammatory irritation of the digestive mucous surface. There are general depression, languor, and dulness, with pallor and collapse of the countenance. The lips swell, and become slightly fissured, especially at the commissures. The appetite is capricious, variable, sometimes ravenous and perverted; and flatulence, abdominal distension, uneasiness, and general disturbance follow a full meal. There is sometimes a craving after the most indigestible substances, and the more voracious the appetite, the more marked become the abdominal symptoms and the emaciation. The belly is large and tense, but not painful on pressure, unless on firm or prolonged pressure. The breath is offensive, the tongue loaded, variable, or streaked; and the perspiration is acid, heavy, or nauseous, owing to the state of the follicular secretion. At an early period, pain is sometimes felt in the back and loins; and sharp, lancinating, or griping pains, of short duration, but recurring three or four times in the day, are often experienced deep-seated in the abdomen. Occasionally nausea and mucous vomiting occur, without, in some cases, affecting the appetite. The state of the bowels is at first variable, but generally much confined, or extremely relaxed, the latter being most frequent or prevalent as the disease advances. The stools are unnatural, offensive, mucous, and subsequently yeasty or chalky, and occasionally contain worms, which had been generated probably long before, owing to chronic debility of the digestive functions.

21. With the increased fulness, the hardness of the abdomen becomes more remarkable, and emaciation advances rapidly. The pulse is accelerated, particularly towards evening; and during sleep, profuse perspirations break out on the forehead and breast. Fretfulness, dulness of the mental faculties, and aversion from all exertion, are generally manifested.

22. *b.* At an *advanced period* the emaciation, hectic symptoms, and disorder of the bowels become still more remarkable. The features are collapsed, sharpened, pale, and wrinkled, imparting an unnatural appearance of old age. The eyes are sunk, without lustre, and surrounded by a dark or livid circle. The limbs are so emaciated as to resemble sticks covered by loose and wrinkled integuments, and contrast strongly with the hard and tumid abdomen. The appetite frequently is still ravenous, and generally also capricious or perverted; and the ingesta passed insufficiently changed, or altogether undigested. The bowels are very much relaxed, and the stools are lienteric, and generally deficient, or entirely deprived of bile. Their white or chalky appearance has been imputed to the presence of chyle rejected by the lacteals. It is, however, doubtful whether or no the food is sufficiently digested to form so much chyle as to account for this appearance, which may be partly owing to a morbid secretion from the intestinal glands. Sir A. Cooper supposed, that the whitish earthy-looking state of the stools is owing to the presence of calcareous matter, but the question has not been determined. Ultimately, the marasmus becomes extreme, but delirium or sleeplessness is rarely observed, and death takes place from exhaustion or inanition, or is accelerated by some contingent inflammation or lesion, as peritonitis, pneumonia, universal bronchitis, or serous effusion within the cranium. Such is the usual course of the disease; but the symptoms vary not only in different cases, but also in the same case.

23. *c.* The *duration* of the malady is various, according to the nature of antecedent and concomitant disorders, and of consecutive lesions. Owing to the common association with it of chronic inflammation of the intestinal mucous membrane, the *pain* felt in the abdomen is to be attributed as much to that affection as to the mesenteric disease, particularly when it is only occasional, intermittent, and griping. That which proceeds chiefly from the mesenteric disease is dull or aching, is referred chiefly to the centre of the abdomen and back, and is not increased by pressure unless it be firmly directed to the back. When severe and continued pain is felt in the back and loins, it is sometimes owing to concomitant disease of the vertebræ. *Swelling* of the abdomen is very general, but it is owing chiefly to flatulent distension of the bowels, consequent upon debility and chronic inflammatory irritation of their mucous surface; the disease of the glands forming but a small part of this swelling. Accumulation of fæcal and indigested matters sometimes also contribute to the abdominal distension. It is comparatively rare, that the enlarged glands can be felt through the abdominal parietes, unless the abdomen be much sunk or collapsed, as well as emaciated. The irregular swelling and hardness sometimes mistaken for these glands, have occasionally been owing to fæcal accumulations in the cells of the colon, to tubercular disease of the peritoneum, or to some other lesions. The urine is often diminished in quantity; sometimes

it is milky in appearance, and contains the earthy phosphates.

24. v. COMPLICATIONS AND CONSECUTIVE LESIONS. — This disease is rarely simple even at any one period of its course; and it is but seldom primary, some disorder preceding it, and accompanying its early or advanced progress. These disorders have been already noticed (§§ 15, 16.); but the most common are chronic inflammatory action in the intestinal mucous surface, tubercular disease of the lungs, intestinal worms, and tubercular enlargement of various glands; more particularly of the cervical, bronchial, and axillary glands. In most cases, the *affection of the bowels* both precedes and accompanies the mesenteric malady; although, in scrofulous constitutions, the latter may precede the former; but the chronic inflammation, enlargement and induration of the mesenteric glands, without scrofulous infiltration of them, which is sometimes met with particularly in adults, is almost always caused by the intestinal disease, especially by disease of the intestinal glands. The same remarks apply to the form of intestinal irritation attending, and in some respects constituting, *infantile remittent fever*, in the course of which mesenteric disease is often developed. The connection of this latter with *intestinal worms* is shown by the frequent evacuation of them during the course of the malady; the worms existing previous to alteration of the glands, co-existing with its early stages, and disappearing as it proceeds to a fatal issue.

25. *Phthisis pulmonalis* is very frequently associated with scrofulous disease of the glands of the mesentery, and either malady may precede the other. Although the disease of the lungs may not be attended by that of the glands, the latter rarely exists for a considerable time without inducing the former. *Inflammation of the peritoneum*, especially chronic peritonitis, or even chronic tubercular peritonitis, may be complicated with this malady, but commonly as a consequence of chronic inflammation of the intestinal glands and mucous surface; the inflammatory action extending, with or without ulceration, from the internal to the external coats of the bowels. On examination of fatal cases of chronic diarrhœa or dysentery, in both temperate and warm climates, mesenteric disease is not infrequent, the malady commencing with disorder of the intestinal mucous surface, which has been followed by ulceration, by alteration of the mesenteric glands, and ultimately by some form or other of peritonitis, occasionally extending to the surface of the mesentery. Scrofulous disease of the *vertebræ, rachitis,* and inflammation or suppuration of the *psoæ muscles*, or of the adjoining cellular tissue, sometimes also complicate the mesenteric malady.

26. Of the above complications, more than two may co-exist in the same case. Thus, *after death*, I have observed extensive disease and agglomeration of the mesenteric glands, ulceration of the intestines, chronic peritonitis, and tubercular disease of the lungs — a combination by no means infrequent.

27. There are also *certain alterations*, sometimes contingent upon the mesenteric disease, deserving notice. Of these, serous effusion within the cranium is not the most infrequent. The inflamed and suppurating glands may also give rise to various changes in their vicinity — to peritonitis from perforation of the peritoneum, to ulceration into the intestinal canal, and to pressure upon adjoining canals and cavities, as the pylorus, common bile and pancreatic ducts, &c. Sir A. COOPER mentions the occurrence of adhesion of the suppurating glands with the parietes of the abdomen, and the discharge of their contents externally, or even both externally and internally into the intestinal canal, thereby giving rise to an artificial anus. The appearance of pus in the stools consequently upon scrofulous suppuration of the mesenteric glands, has been attributed by SCHMALZ and others to the opening of the abscesses thus formed in the mesentery into the cavity of the intestines. This result, however, must be rare; the purulent matter observed in the stools being more probably formed by the chronically inflamed villous surface of the bowels, and by incipient ulcers. I have seen not only in children, but also in adults, compression, irritation, and inflammation of adjoining parts, produced by the diseased lacteal glands. Pressure upon, and narrowing of, the pylorus, or of the common bile and pancreatic ducts, occasioning vomitings of the ingesta, &c. in the first case, and jaundice in the second, are not very rare consequences of the mesenteric disease. M. ANDRAL states that the ureters, and even the vena cava, may be so compressed by the enlarged glands as to occasion dropsy.

28. vi. DIAGNOSIS.—From what I have stated, and from the very frequent complications of the malady, it may be inferred, that an accurate diagnosis of it, particularly in the earlier parts of its progress, is by no means easy. The diseases with which it is most commonly confounded are chronic inflammation of the mucous surface of the bowels, infantile remittent fever, intestinal worms, chronic and tubercular peritonitis, and scybala retained in the cells of the colon. Although it is of importance, especially in respect of the *prognosis*, to ascertain the exact pathological condition, and how far either of these may exist singly, or be associated with one another, or with some different malady, still a mistake in their diagnosis is rarely attended by serious results, owing to the general indications of cure being nearly the same for all, although the means should be varied for each.

29. The phenomena more *particularly indicating mesenteric* disease at an early period are, the scrofulous diathesis and phthisical state of the patient, with a blanched and relaxed skin; irregularity of the bowels and stools, or diarrhœa, the evacuations being undigested matters rather than morbid secretions; the ingestion of food not being followed by immediate inconvenience, as increase of pain, or calls to evacuation; the nature of the ingesta not sensibly influencing the disease; the absence of thirst, of heat of skin, and of tenderness of the abdomen; emaciation, and collapse of the features; and absence of indications in the stools of irritation of the intestinal mucous surface.

30. *A. Infantile remittent fever* is liable to be mistaken for mesenteric disease; and, as I have above stated (§ 24.), it often occasions this malady. It is very difficult to distinguish between these diseases, especially during the early stages of the latter; but, in the mesenteric disease, there is a more general manifestation of the scrofulous diathesis, often with enlargement of the cervical and other glands, than in the infantile remittent.

The emaciation is greater and more rapid, whilst the appetite is more ravenous and more perverted. The remittent fever is attended by short intervals of apparent improvement, and always with regular diurnal remissions, which are not so evident in the mesenteric disease until the last stage, when it assumes the truly hectic form; and, in this stage, the extreme emaciation, distension and knotty hardness of the abdomen, the chalky or lienteric state of the stools, and the general appearance of the patient, will readily distinguish it from *infantile remittent* (see art. FEVER, § 278. *et seq.* for the history of that disease).

31. *B. Chronic inflammation of the intestinal mucous surface*, whilst it very frequently occasions mesenteric disease, is readily confounded with it in its early course. But the intestinal affection is attended by greater heat, pain, and tenderness of the abdomen, than are observed in the mesenteric disease; and by more thirst, more febrile excitement, and more mucous or greenish stools; the symptoms being all increased by the ingestion of food, especially of stimulating food. The common association of the intestinal with the mesenteric disease, and the frequent origin of the latter in the former, render the diagnosis extremely difficult. Still attention and experience will enable the physician not merely to distinguish between them, but also to recognise this complication, as well as the other associations and consequences of the disease alluded to above (§ 24. *et seq.*), particularly if the causes, the several concurring influences, and the effects of treatment, be taken into consideration.

32. *C.* The symptoms of the common *round worm of the intestines* resemble mesenteric disease, particularly in respect of the ravenous appetite, the tumid abdomen, and emaciated extremities; but the absence of the characters of scrofula, the itchings of the nose and anus, frequent startings, grinding of the teeth, and the effects of remedies, in the former, will distinguish between them when they are not associated; but when associated, as is sometimes the case, the diagnosis is much more difficult.

33. *D. Chronic peritonitis*, simple or tubercular, may be mistaken for mesenteric disease, and is not so readily distinguished from it as stated by Dr. PEMBERTON. It is generally attended by more tenderness and pain on pressure than the latter, and by superficial pricking pains. In chronic peritonitis, the abdomen imparts the sensation of more superficial hardness or of being bound down, and it is more generally dull on percussion than the mesenteric malady. Vomitings, also, are more frequent in the former than in the latter. Peritonitis, however, is generally a consequence of chronic inflammation of the intestinal mucous surface, which may develope mesenteric disease either previously to, or coetaneously with, the peritonitis. In this case, the peritonitis will mask the mesenteric disease. In many cases of chronic peritonitis which I have seen thus developed in children, I have met with very few where the mesenteric glands were not found diseased upon dissection.

34. *E.* The frequent association of *phthisis* with mesenteric disease above alluded to (§ 25.) may be detected, particularly when the former is advanced, by shortness of breathing, by short hacking cough, by the expectoration, by percussion, and by the stethoscopic signs. When the bronchial glands are the seat of tubercles, and the lungs are comparatively free from them, the diagnosis is extremely difficult. Moreover, tubercular disease within the chest may be confounded with mesenteric disease, the diarrhœa and state of the stools attending an advanced period of the pulmonary malady increasing the difficulty of the diagnosis. It is only by a careful examination of the thorax and abdomen, by auscultation and percussion, that the difference between them, as well as the association of both (which is more common than is usually suspected), can be fully ascertained.

35. *F.* When the mesenteric disease is *far advanced*, it generally manifests itself so as not to admit of doubt, unless it be masked by chronic peritonitis, or by serous effusion into the peritoneal cavity. At this period the enlarged glands may be sometimes felt, especially if the patient is examined early in the morning, and when fasting. But scybala retained in the cells of the colon may be mistaken for them. The enlarged glands, however, are found nearer to the centre of the abdomen, and are attended by slight pain when examined with firm pressure. Scybala, on the other hand, are detected in the course of the colon, particularly in the left iliac fossa, and are not usually accompanied by tenderness on examination; nor by much emaciation, or lienteric stools. In these cases, which admit of doubt as to the presence of scybala, the use of purgatives, aided by enemata, will generally assist the diagnosis. I have met with instances of indigestible substances retained in the cells of the colon for many months, occasioning abdominal fulness with hardness, emaciation, and constitutional disorder, which were mistaken for mesenteric disease, but which were removed by the strenuous use of stomachic purgatives, the substances causing the disorder sometimes resisting the operation of purgatives for many days.

36. vii. APPEARANCES AFTER DEATH. — The mesenteric glands present, in the disease now described, particularly as it occurs in all climates and at all ages, although most commonly after weaning and in childhood, all the changes described in the article LYMPHATIC GLANDS (§ 54. *et seq.*), the tubercular changes being very much the most frequent. At an early stage the glands are redder, larger, and denser than natural; and subsequently tubercular matter is deposited either within or around them, or both; its accumulation causing atrophy and ultimately destruction of the glands, this matter occupying their places, and, in some instances, accumulating to such an extent, as to give rise to an agglomeration of them into one very large mass. Those glands, containing tubercles which are advanced, are of a dull white colour and firm consistence; and, when the deposit is not very large, the lymphatic vessels in the glands still allow injections to pass through them. This circumstance has induced some to suppose that the tubercular matter is not accumulated in these vessels, but is deposited in the cellular tissue of the glands. Ultimately the tubercular matter softens, and presents appearances, and produces changes, similar to those observed in tubercular disease of the lungs.

37. Besides the diseased mesenteric glands, inflammation and ulceration of the intestines, par-

ticularly of the lower portion of the ileum; inflammation and adhesion of the peritoneum, often with tubercular formations; and tubercular disease of the lungs, and of the bronchial and cervical glands, are found in most instances. There are very few cases, in which these alterations of the digestive mucous surface and lungs are not observed in addition to the mesenteric disease. Tubercles are also occasionally found in other situations, as in the liver, brain, &c.; and serous effusion in the peritoneum and between the membranes of the brain, with or without tubercular formations, is also sometimes met with.

38. viii. THE NATURE of the disease is manifest from its early history and ultimate changes — both classes of phenomena showing that the mesenteric alterations are a part only of a general or constitutional malady — that these alterations, with those often associated with them in the lungs, peritoneum, and other glands, are generally manifestations of scrofula, which, as they become developed, react upon the frame, increasing debility, and producing irritation, fever, and its usual consequences. The common procession of disease is generally as follows: — at first, constitutional vice and debility, impaired digestive and assimilating functions, irritation of the digestive mucous surface, and imperfectly elaborated chyle; subsequently, irritation and enlargement of the mesenteric glands, followed by tubercular deposits in them, and in other organs or parts; and, lastly, constitutional irritation and hectic fever; the extreme emaciation ultimately produced being not so much a consequence of obstruction of the mesenteric glands, as of the hectic or irritative fever, and of the changes in the bowels, lungs, and other parts.

39. ix. PROGNOSIS.—When the disease is clearly manifested, the prognosis is unfavourable; and no hopes of recovery should be entertained when it is associated with tubercles in the lungs, or with chronic peritonitis. On the other hand, when the disease is not far advanced, and before hectic symptoms are established, or the emaciation become great, or the stools have assumed a chalky or lienteric appearance, hopes of recovery may be entertained, although, even in these cases, a cautious prognosis should be given. The younger the child the greater is the danger. The causes and complications of the disease should also in some degree influence the prognosis. When these causes admit of removal — when unwholesome food and impure air produce the malady, and may be removed — and when intestinal irritation is the only complication, then a more favourable opinion may be given than in other circumstances. An improvement in the colour and expression of the face, a reduction of the size of the abdomen, a more fæculent character, and less frequent passage, of the stools, a gradual recovery of flesh, and a diminution or disappearance of evening accessions of fever, are indications of recovery.

40. x. TREATMENT.—The *indications* of cure are — 1. To ascertain the predisposing and exciting causes, and to remove them. 2. To support the constitutional powers, to restore the diseased glands to their healthy state, and, at the same time, to allay irritation of the alimentary canal. 3. To remove associated disorder, and to prevent the occurrence of disease in related organs or parts.

41. *A.* The *removal of the causes*, when fully accomplished early in the disease, will sometimes of itself restore the patient to health. It is true, that the early progress of these cases admit of great doubt as to their being cases of mesenteric decline. But, although they may not be fully developed instances of this malady, they are fast progressing either towards it or towards as dangerous a malady, namely, to chronic ulceration of the intestines and consequent peritonitis. If, in infants at the breast, the nurse's milk have disagreed, or if the milk be poor, innutritious, or disordered by prolonged suckling or ill-health, the nurse should be changed; and the infant should have the advantage of wholesome milk, and the warmth of the bosom of a young and robust nurse. When the disease manifests itself at this early age, the enjoyment of vital warmth is next in importance to wholesome and nutritious food. If the disease be caused by weaning, or by inappropriate, too much, or incongruous food, causing irritation of the digestive mucous surface and an imperfectly elaborated chyle, a change of diet, a trial of the more digestible and less irritating kinds of food, and a liberal use of asses' milk warm from the animal, sometimes with lime-water when the bowels are much relaxed, are means which should not be neglected. In all instances, but particularly when the patient resides in large towns, or in close ill-ventilated situations and chambers, change of air into the country, or to the sea-side, selecting dry and elevated localities, is one of the most successful means of cure that can be adopted. These advantages will be greatly enhanced by regular exercise in the open air, and by exposure to light and sunshine.

42. The frequent commencement of tabes mesenterica in chronic irritation of the intestinal canal, in infantile remittent fever, and in other disorders mentioned above (§ 24.), points out the importance of removing these diseases as soon as possible; and as they originate in the same circumstances and causes which are so productive of this malady, treatment will often be unavailable for them, if unaided by change of air and its consequent advantages.

43. *B.* Before developing the *second indication of cure*, which comprises the strictly medical treatment of the disease, I shall take a brief view of the means recommended by other writers. These consisted, in this country, until a comparatively recent period, chiefly of mercurials in some form or other, generally conjoined with purgatives or alteratives; the use of other more rational means being commonly stigmatised with the designation of "inert practice," nothing appearing to many either good or appropriate, or efficacious, to which the term "active," as regards its immediate operation, was not applicable. No small mischief arose in those days from attempts made to reduce a tumid abdomen by means of cathartics or purgatives, the improper use of which often increased the flatulent distension, perpetuated intestinal irritation, and thereby, as well as by reducing the constitutional powers, augmented the mesenteric malady, and developed several of its most fatal complications.

44. *a. Mercurials*, and more particularly the *chloride* of mercury, have been prescribed for this disease by BAILLOU, BORDEU, PORTAL, WHITE, CURRY, and many others. UNDERWOOD gave calomel twice or thrice a week, and the carbonate

of soda during the intermediate days. He also had recourse to an infusion of burnt sponge and senna; and afterwards to bitters and chalybeates. Dr. Burns recommended calomel with mild purgatives, and gentle tonics and frictions of the abdomen. Dr. Pemberton advised calomel to be given at bedtime, salts in the morning, and tonics with conium in the intervals. Mr. Abernethy and his disciples prescribed calomel, with rhubarb and ginger, on alternate nights — or blue pill and laxatives, followed by a prolonged course of Plummer's pill and sarsaparilla. Sir A. Cooper always resorted to the *bichloride of mercury*, one grain being dissolved in two ounces of the tincture of cinchona or of rhubarb and a tea-spoonful given twice a day. He also advised plasters over the abdomen, or frictions, and a nutritious diet. Farre and others confided in mercurial frictions. Cullen, with much justice, has condemned the use of mercurials if otherwise prescribed than as occasional purgatives or alteratives; and there is no doubt of their having been hitherto too often employed in this disease in an indiscriminate and empirical manner. Still, when the liver is torpid, the stomach is irritable, and the lower bowels inactive, the milder mercurial preparations, conjoined with rhubarb, or with rhubarb and magnesia, or an alkaline carbonate, are often of essential service; and I have found the practice advised by Sir A. Cooper, modified according to circumstances, sometimes of service.

45. *b.* The same remark applies to the use of *purgatives* generally. The advantages which arise from them can be realised only by a judicious selection of them, and by the use of them appropriately to the circumstances of the case. Fordyce preferred *rhubarb*, and conjoined it with the *neutral salts*, especially the tartrates. Herz and Beaumes also preferred rhubarb, the former giving it with the *acetate of potash.* Most writers and modern practitioners have prescribed it, either in substance or infusion, with the *sulphate of potash.* Dr. A. Thomson has praised the combination of the two with calumba, directing ten grains of sulph. of potass., six grains of calumba, and three of rhubarb, thrice daily; and frictions of the abdomen with soap liniment. Whilst purgatives have been thus generally employed, the selection has been chiefly limited to those which are the least weakening, or the most likely to produce deobstruent effects. The exhibition of *tonics* with these, or in the intervals between them, has been very generally adopted; and, although the practice has been inveighed against by Broussais, and his followers as being injurious, in respect not only of the combination of the two classes of remedies, but also of the employment of either of them singly, still it is appropriate to many cases, and to certain states and stages of the malady; and, as regards the results, more successful than the application of leeches to the abdomen, and the employment of demulcents recommended by this physician and his once numerous disciples.

46. *c.* Various *alteratives*, or substances intended to produce an alterative and a deobstruent or tonic effect, have been prescribed for this disease besides mercurials. Pinel, Hebréard, Hufeland, and others, have recommended the *muriate of barytes*, but Ferriar and Thomson have not confirmed the opinion expressed of it by these writers. Dr. J. Hamilton was favourable to the use of *antimonials* when aided by a warm bath every night, by frictions with an opiate liniment, and by nourishing diet. There are few alteratives more serviceable in mesenteric disease than *alkalies* and alkaline carbonates, conjoined with mild tonics; and there is none more generally prescribed for it. Still, neither these, nor any of the medicines already mentioned, should be depended upon solely, different means being required with the varying characters of the malady.

47. *d.* It is obvious that, when disease is so far advanced as to enlarge the mesenteric glands, or to occasion symptoms usually attending or indicating this lesion, it becomes necessary to *support the constitutional powers, whilst we endeavour to restore these glands to their healthy functions and condition;* and it is equally obvious, that neither can the constitutional powers be supported, nor the glands be restored to health, as long as irritation is allowed to exist in the alimentary canal. Therefore, having cleared away morbid secretions and fæcal accumulations, those substances which are most *calculated to correct, improve, or restrain morbid action and secretion*, should be prescribed. With this view, small doses of hydrargyrum cum cretâ may be given at bedtime, either with Dover's powder, or with ipecacuanha and extract of poppy or of hop; and, during the day, creasote may be taken with demulcents, and with cretaceous mixture and the compound tincture of camphor, if the bowels be much relaxed. A warm bath should also be used at bedtime, and the abdomen be afterwards rubbed with a liniment composed of the compound camphor and the turpentine liniments, to which a little of olive oil and of cajuput oil may be added. The patient should wear flannel next to the skin, and sleep in blankets or in cotton sheets; and be allowed light nutritious diet. If the bowels become confined, rhubarb and sulphate of potash, or castor or olive oil, may be given; or their action may be solicited by means of an enema containing these oils, alone or with spirits of turpentine. Having in some degree allayed irritation and corrected morbid secretion by these means, or even without having attained these ends, these remedies having been prescribed during a few days, the preparations of iodine* should be cautiously resorted to.

48. But, in order that any advantage may be obtained from these preparations, and even that mischief may not be caused by them, it is essentially requisite to prescribe them in small doses, and to carefully observe their effects. If the bowels be too much relaxed, the *iodide of lead* or *of iron* may be given with *ipecacuanha*, and extract of hop or of poppy in the form of pill; but

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* The author was probably the first in this country, and certainly amongst the first in any country, to prescribe these medicines in this and in other constitutional maladies. When he returned to London from the continent in 1820, he brought with him those preparations of iodine which had then been tried abroad; and as soon as they and others were prepared, or introduced into this country by Mr. Morson, he had recourse to them in private and public practice. The same remark applies to *creasote* and some other substances. The first dose of creasote prescribed in this country, was by the author in consultation with Dr. Roscoe. This medicine, however, was not then to be procured in London; Mr. Morson, who was and still is the principal manufacturer of it, being then obliged to obtain it from abroad before the prescription could be prepared.

in other circumstances, and at an early stage of the disease, the *iodide of potassium* may be prescribed with the liquor potassæ in the infusion or decoction of cinchona, or in any tonic tincture, with the compound tincture of camphor. The *turpentine liniment*, or *embrocation*, should also be applied over the abdomen, and the diet and regimen advised for this (§§ 41. 53.) and other scrofulous diseases strictly pursued.

49. The diseased state of the digestive mucous surface has been considered by BROUSSAIS and his disciples to contra-indicate the use of iodine, and all tonic and stimulating substances. But the affection of this surface is not a true inflammation, at least not a sthenic form of inflammation, but rather a state of asthenic capillary congestion, which is more readily removed by tonics and stimulants, especially such as are also astringent, than by relaxants or depressants; and which not infrequently passes rapidly into ulceration if the former be not resorted to.

50. The principal error in the treatment of this malady has been that of viewing and treating it as limited to the mesenteric glands, and without reference to other lesions often associated with it, and to the states of *vital depression* and of *anæmia*, attending not only its advanced, but even its early progress, in many instances. In these states, and even in those associated with tubercular disease of the lungs, the preparations of iron, in suitable forms of combination, are especially beneficial. Although curious, it would be almost endless, to notice the various preparations and numerous modes of combining them, recommended by authors in this and in other diseases, with which it is often associated; each one, with a more ardent desire to appear original than to prove useful, praising his own way of exhibiting them. Having had no small experience of most of the preparations of iron, I can state that most of them are more or less beneficial in those states and associations of this disease just mentioned, but that some of them are to be preferred to others. The iodide of iron prescribed in the syrup of sarsa, and syrup of poppies, if the bowels be too open; the mistura ferri composita, with the tinctura camphoræ composita, and extractum conii; combinations of the oxides of iron with the alkalies or alkaline carbonates; the tincture of the sesquichloride of iron, or of the ammonio-chloride, with or without a small dose of the dilute nitric acid, and two or three drops of the tinctura opii, or tinct. camphoræ comp.; the sulphate of iron with the carbonate of an alkali, and with rhubarb or powdered cascarilla; the compound steel pill with soap, or the compound soap pill and ipecacuanha, are preparations and combinations of them severally employed by me in those conditions of the disease in which the support of the vital energies, and the promotion of assimilation and sanguification, are more particularly indicated; but I have never overlooked those external means and applications alluded to above (§§ 47, 48.), and have generally employed them at the same time. There are various other recently introduced preparations of iron, which are more fashionable than efficient. I have tried them sufficiently, particularly the lactate, the citrate, the ammonio-citrate, and the ammonio-tartrate of iron. Of these, the first and the last are the most efficacious, and to children especially the most palatable. The others are also sufficiently palatable, but this is their principal virtue.

51. Whilst these or other tonics are being employed, the bowels will generally require due regulation, by means of narcotics and astringents when they are too relaxed, and of stomachic or chologogue purgatives when they are costive. In all cases, care should be taken to preserve a due secretion of bile, as this fluid is necessary not only to the elaboration of healthy chyle, but also to a healthy state of the intestinal mucous surface. Hence I have (since 1818) always prescribed the *inspissated ox-gall* with the above or other medicines, when the secretion of bile has been deficient, and the digestive mucous surface irritable and relaxed; although, for some years, this substance could not be procured at the principal chemists or druggists until I directed the preparation of it, so entirely had it been overlooked in this country. Numerous formulæ containing it will be found in the *Appendix* and in the early part of this work. Long subsequently to the publication of these, and very recently, some writers in periodical works have lauded its properties, with attempts at originality to which they had not the smallest claims.

> "Miranturque novos fructus, et non sua poma."

52. *C.* The *third intention*, viz. to remove associated disorder, and to prevent the occurrence of disease in related organs, as far as either object can be attained, can be accomplished only by fulfilling the indications already developed; for the chief complications, namely, irritation of the digestive mucous surface, infantile remittent fever, tubercular disease of the lungs or of other glands, &c. are best combated by the means already specified, aided by change of air, diet, and regimen; and these, at the same time, are the most likely to prevent the occurrence of more extensive disease, by supporting the constitutional powers, and promoting the digestive and excreting functions. Whatever complication may appear in the course of this disease is necessarily characterised by asthenia, owing to pre-existing depression of the vital powers, and to imperfect sanguification and assimilation, and is irremediable unless by restorative means, in conjunction with such as the nature of the complication may require. But, in most of these complications, as well as in the more simple states of the disease, external derivatives, and means which will allay or diminish excessive action and secretion, where either is augmented, or which will increase either or both, when impaired or arrested, are chiefly indicated. A careful diet and regimen will also materially advance these objects.

53. *D. Diet and regimen* constitute a principal part of the treatment of this disease; but the former cannot always be assigned with sufficient precision — no particular kind of food proving beneficial in all cases, and rarely even in the great majority. For the youngest class of patients, the milk of a healthy nurse, the warmth of her bosom; light farinaceous food, with warm or boiled milk; asses' milk or goat's milk, warm from the animal; change of air, particularly to the sea-side; warm salt-water bathing, and gentle, but regular exercise in the open air and sunshine; and flannel clothing next the skin, are generally beneficial. If the disease appear after weaning, nearly the

same diet and regimen as now advised, with small quantities of the lightest kinds of animal food, or animal broths with boiled rice, or with stale or toasted bread, &c. are required. At a somewhat later period of life, the farinaceous kinds of food boiled with milk, and the more digestible articles of animal diet, may be allowed in such quantity as the peculiarities of the case and the amount of exercise may suggest. Sea-bathing in summer and autumn is also necessary. In general, bulky vegetables and fruits should not be given; and the intervals between meals ought to be duly regulated, as well as the quantity of food, according to the age and strength of the patient, and stage of the disease.

54. *E.* For the *prevention* of the disease, when it is threatened, the means just specified, particularly change of air; sea, or country, or pure air; sea-bathing, and flannel worn next the skin; suckling by healthy nurses for a sufficiently long period — from nine to fourteen months; nourishing and digestible food; exercise in the open air, and attention to the states of all the secretions and excretions, correcting and promoting them as circumstances may arise, are the means on which only dependence can be placed.

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MILIARY ERUPTION. — SYNON. *Sudor, Miliaria, Sudamina; Febris Miliaris; Purpura Miliaris; Miliaris Sudatoria; Sudor Miliaris; Papula Miliaris*, Auct. *Morbus Miliarium*, Allionius. *Exanthema Miliaria*, Parr. *Febris vesicularis, Febris purpurata Miliaris*, Hoffmann. *Emphlysis Miliaria*, Good. *Purpura alba, Purp. Puerperarum*, Auct. *Hydroa*, Rayer. *Pourpre blanc, Miliaire*, Fr. *Friesel, Frieselblattern, Weisse Friesel*, Germ. *Migliaria*, Ital. *Miliary Fever.*

CLASSIF. — 1st CLASS, 3d ORDER (*Cullen*). 3d CLASS, 3d ORDER (*Good*). III. CLASS, II. ORDER (*Author*).

1. DEFIN. — *An eruption of vesicles, seldom exceeding the size of a millet seed, over a large surface, generally symptomatic of serious disease, or caused by a heating regimen and confined air.*

2. The symptomatic miliary eruption here to be considered, is more correctly designated by the term *sudamina* than by any other, and is entirely different from the "*epidemic sweating fever,*" described in another article (see FEVER, § 416.), and which is often attended by a miliary eruption, as there shown. This form of epidemic fever has rarely occurred in modern times; and the miliary eruption, formerly not infrequently met with in lying-in women, is now rarely seen, owing to an improved regimen and practice in these circumstances. Besides being *caused* by irritation of the skin, and especially by *profuse perspirations*, however induced; and besides being an attendant upon the epidemic fever just referred to, the eruption of miliaria or sudamina is met with as an occasional symptom — 1. In those puerperal diseases which are characterised by fever, and a morbid state of the circulating fluids, and are caused by impure air, and a heating regimen: — 2. In the early stages of small-pox, measles, and other eruptive fevers; and in the advanced state of adynamic or typhoid fevers: — 3. In the course of fever depending upon gastro-intestinal or internal irritation or inflammation: — 4. In connection with acute rheumatism: — and 5. In the course of puerperal inflammations of serous membranes. In all these circumstances, this eruption is more correctly denominated *sudamina* than miliaria, as it is always attended by a copious perspiration and increased heat; and, although it formerly was not infrequent in those maladies, when a heating regimen was so generally adopted during their treatment, it is now seldom and even very rarely observed.

3. i. The *symptoms* of epidemic, miliary, or *sweating fever*, are fully detailed in the article FEVER (§ 420.), it only remains for me to notice the characters of the eruption, when it is symptomatic of other maladies, or when it occurs after lying-in, or in consequence of copious perspirations and a heating regimen. From what I have already stated, it will be seen that I consider the epidemic fever there described to be more correctly designated by the name of *sweating fever* than by that of miliary fever; and that the term *miliaria* is here viewed as synonymous with *sudamina.* The vesicles of this eruption, seldom exceeding the

size of a millet-seed, are sometimes arranged at some distance from each other, but are generally distinct, and form patches. They are seldom confluent, and rarely coalesce so as to form bullæ. They are at first small and prominent, transparent, and globular; their contents appearing as clear as limpid water, but becoming more opaque or milky. The *surface* upon which the vesicles are scattered varies in colour — 1. With the nature of the disease upon which they are contingent: and 2. With the state of the vascular system as regards plethora, &c. When this eruption accompanies any of the exanthemata, or when the patient is plethoric or robust, the vesicles form upon a red or erythematous surface, and constitute the *miliaria rubra* of authors, the colour of the surface appearing through the limpid and transparent fluid of the vesicles. But when the fluid becomes opaque, white, pearly, or milky, and when the vesicles appear on a comparatively pale surface, the term *miliaria alba* has been applied to them. When they thus occur without inflammatory appearances in the skin, the term *sudamina* is most appropriate.

4. The vesicles naturally *terminate* in resolution without forming scabs or scars, but the cuticle covering them always desquamates. The *duration* of the eruption varies with the circumstances which develope them; but it is generally from three to eight days, or longer. It is sometimes prolonged by the appearance of the eruption in different situations successively; or of a second crop in the same place. The disappearance of the eruption has little or no influence upon the course of the disease, of which it is symptomatic, although some writers have considered a retrocession of it injurious. But, where this has appeared to have been the case, the retrocession may have been the consequence of pre-existing internal mischief, rather than the cause. As the sudden disappearance of the eruption is generally caused by the application of cold, by improper food and regimen, by mental emotions, and other powerful causes, the consequent ill effects are to be attributed to these chiefly.

5. ii. The *diagnosis* of miliaria is easy, owing both to the appearance of the vesicles, and to the circumstances in which they are observed. The only eruption with which it can be confounded is *eczema*, the vesicles of which are crowded in a small space, and are very confluent; whereas, in miliaria, they are distinct and spread over a large surface, always accompany an acute or febrile disease, are rapid in their progress, and of short duration.

6. iii. The *prognosis* of the acute diseases of which miliaria is symptomatic, is not affected by it. The eruption itself only indicates a state of increased action with determination to the cutaneous surface. In connection with epidemic fever, as shown elsewhere (see FEVER, § 419. *et seq.*), it evinces a serious state of disease.

7. iv. *Treatment.*—The eruption itself requires comparatively little attention; the disease of which it is symptomatic demanding the chief care. In most of the maladies in which it occurs, a cooling regimen is necessary. Refrigerant drinks, and sub-acid fluids, particularly those containing dilute hydrochloric acid, may be allowed. The patient's room should be well ventilated, and the clothes on his bed ought to be light. The bowels should be kept gently open, and the surface of the body sponged frequently with tepid vinegar and water, or by any other agreeable fluid.

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MORTIFICATION. — See GANGRENE.

MOUTH. — See TONGUE and MOUTH.

MUSCULAR STRUCTURE, DISEASES OF. —

SYNON. *Muscular Tissue or System; Muscles. Muskeln, Heisch*, Germ. *Muscles; Musculaire Système; M. Tissu*, Fr. *Musculo*, Ital.

CLASSIF. — GENERAL AND SPECIAL PATHOLOGY. — MORBID ANATOMY.

1. The muscular system has been usually divided into two orders or parts — into the *muscular system of organic life*, and that of *animal life*; the former being uninfluenced by the will, and therefore called *involuntary*, the latter being powerfully influenced by volition, and hence called *voluntary*. The power or property of animal bodies, usually denominated IRRITABILITY (*see that article*), is especially manifested by this system, and more particularly by the voluntary order of muscles, or those of animal life. Irritability may indeed be viewed as the vital manifestation most especially belonging to this system, although not confined to it in respect of its lowest grade, or that which I have called, in the article just referred to (§ 11.), "*insensible organic contractility.*" I have there also referred this function of muscles to the nervous system, or systems supplying and endowing them (§ 17. *et seq.*). Granting that the muscular structure derives its vital manifestations from the nervous system of organic nerves in the involuntary muscles, and from both that system and spinal nerves in the voluntary muscles, as there shown (§ 18.), it follows that disorders affecting the *functions* and *sensibility* of muscular structures are to be chiefly attributed to one or other of, or to both, these systems of nerves, comprising the nervous centres controlling them. In the brief review about to be taken of the alterations of muscular structures, I shall *first* notice those which are *functional*, or consist of alterations of sensation or motion; *second*, changes of *vital action*, and the *consequences* which result from them; and *third*, those which are more strictly *structural*, *physical*, and *mechanical*.

I. Alterations of Motion and Sensation of Muscles.

2. i. The *contractility* of, or power of motion possessed by, muscles may be variously affected. 1st. By changes in the state of the organic nervous system, and of its vital endowment, as evinced chiefly by the involuntary muscular system:—2d. By states of the cerebro-spinal nerves, or of the spinal chord, medulla oblongata, or brain, as manifested chiefly by the voluntary muscles:—3d. By the circulation of blood in the muscular structure, and particularly by interruption of the circulation through either the arteries or the veins;—and, 4th. By the condition of the muscular fibres themselves.

3. 1st. That the power of motion, or contractility of muscles, both involuntary and voluntary, is greatly dependant upon the state of the organic nervous or ganglial system, is shown by the manner in which this power is affected by the numerous causes and pathological changes which powerfully influence — which either excite or depress — this part of the nervous system, as stated in the article Irritability. The actions of the heart are the chief index of the states of the nervous system of organic life in relation to muscular motion.

4. 2d. That the cerebro-spinal nervous system remarkably affects the muscular system, especially of voluntary motion, is demonstrated by many agents and morbid conditions; but the change in this system, whether exciting or impairing the power of muscular contraction, may be seated either in the nerves supplying voluntary muscles, or in the spinal chord, or in the brain. When a nerve is divided, or tied, the muscle supplied by that nerve is paralysed; when the spinal chord is divided, pressed upon, or severely injured, the parts supplied with nerves proceeding rom that part, and from the chord below the seat of injury, are paralysed; and when any part of the medullary, or white structure of the brain, is injured, the muscles more especially related to that part is paralysed, or removed from the influence of volition. In all these cases *sensibility* may be preserved, the stimulus of volition originating in the brain being no longer conveyed to the voluntary muscles, owing to lesion either of the white or fibrous structure of the brain, or of the spinal chord, or of the nerves. Owing also to irritation of either of these parts of the cerebro-spinal system, the muscular structures connected with them may be excited into inordinate action; and lesions of either, when slight, may merely impair, without entirely destroying, the voluntary motion of the muscles related to it.

5. Whilst the muscular system of animal life is thus subjected to the cerebro-spinal nervous system, it is not to be considered as under this dominion solely and entirely; for many phenomena connected with disease, and even with health, particularly during sleep, show that conditions of the internal viscera, or of the organs supplied either altogether or chiefly with the organic nerves, often affect the voluntary muscular system in a very remarkable manner. In all such instances, the change in this system is produced through the medium of the organic or ganglial nerves, which convey the impression or irritation to the brain, or to the spinal chord, or even merely to the roots of the spinal nerves. Thus, in cases of intestinal worms, or other visceral irritations, the morbid impression is not infrequently transmitted by the ganglial and sympathetic nerves, and ultimately expressed upon the voluntary muscles; and, in most instances, without any intermediate change in the brain, or even in the spinal chord itself, the impression being conveyed directly from the viscus affected, by communicating branches of nerves to the ganglia of the roots of the spinal nerves. Cholera, and several states of convulsion, are proofs of this mode of transmission of irritation from involuntary parts to voluntary nerves and muscles; and the phenomena presented by fœtuses without brains, or without both brains and spinal chords, are also illustrations of it, as shown in the articles Cholera, Chorea, Convulsions, &c.

6. Those inordinate actions of voluntary muscles, resulting from visceral irritation, are often so great as to be entirely beyond the control of the will, as in the diseases just noticed, or unless volition be very strongly exerted, as in some instances of hysteria. Most of the contractions of voluntary muscles that occur during sleep are induced by irritation of internal viscera; and the irritation may intermediately affect the brain and occasion dreaming, according to the nature of such irritation or impression, or it may be more immediately transmitted to the voluntary nerves and muscles ultimately affected, without in any way impressing the sensorium.

7. 3d. That the state of circulation of blood in muscles materially affects their contractile power has been fully proved by experiment and by pathological observation. It is not alone necessary that a sufficient circulation or supply of blood should exist in muscular parts in order to preserve their functions and organisation, but also that the blood be duly oxygenised or changed from the venous to the arterial state. It is fully shown by disease and experiment that interruptions of the changes produced by respiration on the blood impair or disorder the contractility of muscles, by affecting not only the cerebro-spinal axis, but also the muscles themselves; the highly venous or unoxygenated blood affects both the cerebro-spinal system and the muscular structure itself. The phenomena of asphyxia, of the advanced stage of pestilential cholera, and other diseases attended by interruption of the respiratory processes, fully illustrate this proposition.

8. When the principal artery of a limb is tied, and when the supply of arterial blood to the muscles is not kept up by a collateral circulation, the muscles are paralysed, the limb is benumbed, and it soon dies. When the venous current is entirely interrupted the limb is remarkably congested, livid, benumbed, paralysed, and as if locally asphyxied. On the other hand, when the supply of blood to muscular parts is free, abundant, and of a healthy and duly oxygenised quality, the contractile power of muscles is thereby increased and perpetuated.

9. 4th. It is evident that the original conformation, the organisation, and the nutrition, of the muscular fibre very materially affect the amount of its function, or of its contractile power. Muscular parts acquire increased vascularity and development with the frequency of action, and with these, augmented power; whilst they become pale, atrophied, weak, and at last almost paralysed

by disuse. These changes are chiefly owing to increased or diminished determination of nervous power and of arterial blood to these parts, according as their functions are discharged; but they are also owing to the states of nutrition consequent upon the amount of function performed.

10. Of the above causes of disorder of the contractile power of muscles, the most frequent are those which are seated in some portion of the cerebro-spinal system of nerves, and at the same time they are productive of the most manifest effects. This fact is demonstrated by disease. The *palsy* of a single or of a few muscles is generally caused by lesion of the motor nerve or nerves supplying them. Palsy of a portion of the body transversely, or *paraplegia*, is commonly produced by disease in or implicating the spinal chord; and palsy of one side, or *hemiplegia*, is occasioned by lesion of the brain. *Chorea, paralysis agitans*, or shaking palsy, the trembling or *shaking* caused by *mercury* or other *metals*, or by *age*, or by the abuse of *spirituous liquors*, generally depend upon the state of the spinal chord; and are often aggravated, as in chorea, by exertions of volition; the contractions produced by volition being weak, vacillating, and uncertain, owing to the morbid state of the cerebro-spinal system, or to the diseased movements caused by the state of this system. On the other hand, *tetanus, eclampsia, epileptic* and *hysteric convulsions, cramps*, &c., are manifestations in the muscles of irritation of some part of the cerebro-spinal system, more particularly of the spinal chord, the irritation either existing primarily in it, or being propagated to it by ganglial or other nerves, and thence reflected by motor nerves on the muscles.

11. ii. *Lesions of sensibility in muscles.* — These generally proceed from repeated, prolonged, or excessive contraction or exertion, and vary from the slightest feeling of lassitude or fatigue, to the excessive pain attending spasm and tetanus. In some forms, also, of rheumatism, severe aching pains are referred to the muscles, a *myalgia*, which may be owing to alteration of the sensibility of the nerves supplying the muscles.

II. Inflammation of Muscles. — Synon. *Mysitis* (from μῦς, a muscle), *Myitis, Myositis*, Hildenbrand. *Muskelentzündung*, Germ. *Myosite*, Fr.

Classif. — III. Class, I. Order (*Author*).

12. Defin.—*Severe pain of one or more muscles, with great difficulty or impossibility of contracting them, every attempt to contract them violently exasperating the pain, and with inflammatory fever.*

13. The muscular fibre is rarely the seat of inflammation. Indeed, it is doubtful whether or not it is ever inflamed, or can admit of being inflamed, owing to its organisation. Most probably, in those cases in which the muscles have been found exhibiting evidences of inflammation, the fine cellular tissue connecting the fasciculi of their fibres have been chiefly or solely affected, this being the most vascular part of their structure. There can be no doubt that some of the cases, which have been viewed as instances of myositis, have been cases either of rheumatism, in which true inflammation of the muscles does not exist, or of inflammation only of the cellular substance, surrounding or connecting muscles. In rare cases, however, the muscles, in the manner now stated, — chiefly as respects their connecting and surrounding cellular tissue, — are the seat of inflammation. The muscles are no farther affected in rheumatism than as respects their sero-fibrous sheaths and aponeuroses, which sometimes are implicated in that disease, the muscular fibre itself not being inflamed.

14. i. The *causes* of myositis are chiefly external injuries: bruises, wounds, sprains, excessive contraction, or over-exertion; sudden contraction of a muscle when volition has not been decidedly directed to the part, rupture of the fibres of muscles from over-exertion, or from contraction with imperfect volition; dislocations, lifting heavy weights; injuries or wounds of aponeuroses or tendons; and caries or other diseases of adjoining bones, especially of the vertebræ. The muscular fibre is very rarely inflamed from internal causes, or from influences affecting the vital conditions — the sensibility and vascular actions of muscles, — independently of external injuries, although the sero-fibrous sheaths of muscles and tendons, and aponeuroses are often inflamed in the course of *rheumatism*, owing to internal causes and influences affecting their vital states (see art. Rheumatism).

15. ii. The *symptoms* of myositis are extreme pain, soreness, and tenderness of a muscle or muscles, the pain being so much increased by contraction as to render all attempts at motion most difficult, or altogether impossible; increased heat, and indistinct or diffused swelling, of the part; sometimes subsultus of the tendons, or rigid contractions, or spasms of adjoining muscles; and always symptomatic inflammatory fever, with the usual constitutional phenomena of such fever.

16. With the exception of traumatic myositis, which may occur in all situations, the muscles which have been the most frequently inflamed are the psoæ, the tongue, and the diaphragm. The muscles of organic life are oftener the seat of inflammation than those of voluntary motion, particularly the urinary bladder, stomach, œsophagus, heart, &c.; still it is doubtful, even in these, whether or not the muscular structure is inflamed, otherwise than in being implicated consecutively. It is most probable that the inflammation originates, and is seated chiefly, in adjoining or connecting tissues, the muscular fibres being, from their organisation, incapable of experiencing those changes which have been usually termed inflammatory, although their functions are disturbed or interrupted by the disease in which they are implicated.

17. iii. The *consequences of inflammations of muscles* are chiefly *exudations of serum or lymph, softening* of the tissue, *induration, suppuration*, and *gangrene*. — *A. Exudations of serum or of lymph* may take place, in the course of myositis, between the fasciculi of fibres, or from the surface of the fibrous sheaths or aponeuroses enveloping muscles. Such is the case, more especially when muscular parts become involved in the course of diffusive or asthenic inflammations, particularly of the connecting or interposed cellular substance.

18. *B.* True *softening* of muscular textures in consequence of inflammation is rarely met with in the muscles of the skeleton, unless in some of the worst instances of diffusive, erysipelatous, or asthenic inflammations; and after poisoned wounds, and the inoculation of animal poisons. But it is

not infrequent in the muscular coats of the alimentary canal and urinary bladder, in conjunction with a similar change of their other coats, more especially in the course of dysentery and adynamic or enteric fevers. It is also observed secondarily in the diaphragm, particularly when this muscle becomes inflamed consecutively upon hepatitis; and more rarely even in the heart, during the course of malignant, continued, and exanthematous fevers, in cachectic diseases, and in the course of some cases of true carditis. In most of the instances of inflammatory softening of muscles, the colour of the part is changed to a more dark or dusky red than natural, or to a dirty brown. In some cases, however, the softened part has been paler than usual.

19. *C. Suppuration* is not a frequent consequence of myositis. It is most commonly met with in psoitis, but very rarely in the other voluntary muscles; and still more rarely in the substance of the heart. It occurs chiefly in a diffused form, infiltrating the cellular tissue connecting fasciculi, or interposed between muscles. It is thus met with in some cases of caries of the vertebræ, the disease of which has extended to the adjoining muscles and cellular substance; the matter which has been formed infiltrating this substance to a considerable distance. The exudation of serum, or of a sanious lymph, may, according to the states of vital power and of the circulating fluids, give rise to various changes—either to purulent collections, or to an offensive sanies, contaminating the adjoining parts, and sphacelating the cellular and adipose substances which it infiltrates.

20. *D. Gangrene* is sometimes observed consequent upon acute inflammation, occurring in an unhealthy habit of body, or during the progress of malignant fevers. It may destroy large masses of flesh; but this rarely takes place except some previous or co-existing change exists in the nerves or bloodvessels, supplying the gangrened part. In a case to which I was called many years ago by my friend Dr. J. DAVIES, of Hertford, gangrene of all the muscles of one lower extremity proceeded from inflammation of the iliac artery and vein associated with neuritis.

21. *E. Induration* or *hardening* of muscles, with change in their structure, is generally a result of slow inflammatory action, and of the exudation of lymph, thereby produced, into the cellular tissue connecting their fibres. It is met with in both the voluntary and involuntary muscles, in different degrees, and usually is attended by some swelling or enlargement. In the more advanced stages of this change the hardening is increased; the muscle becomes pale, loses its usual texture, and assumes either a leathery, a tendinous, or even a cartilaginous appearance, whilst, at the same time, its bulk is more or less diminished.

22. iv. The *treatment* of inflammation of muscular parts is in no respects different from that of sthenic inflammation of other structures. The usual antiphlogistic remedies and regimen should be enforced, with various modifications as to the extent, nature, and variety of the means to be employed, which the seat of the disease, its causes, and the constitution of the patient, will suggest. In cases where muscular parts are involved in inflammations of an asthenic or diffusive character, incisions are often required to prevent the contamination which would follow if the morbid matter formed in the part was not allowed a free exit. In all respects the treatment, both constitutional and local, should be conducted according to the form the disease assumes, and conformably with the principles fully developed in the articles *Inflammation*, *Erysipelas*, and diffusive inflammation of *Cellular Tissue*.

III. CHANGES OF MUSCULAR STRUCTURES NOT STRICTLY REFERABLE TO INFLAMMATION.

CASSIF.—IV. CLASS. III. ORDER (*Author*).

23. *A.* The *size* of muscles is much influenced by disease.—*a. Atrophy* of muscles is very common, in consequence of deficient nutrition, of a cachectic state of the system, of febrile action, of masturbation and venereal excesses, and of visceral and constitutional disease. In these circumstances the wasting is general; but it is often partial, as in the muscles of the legs and lower limbs, particularly in persons addicted to the excesses just mentioned, and in those who are lame. Disuse of the muscles of voluntary motion always occasions their atrophy. Long continued pressure has a similar effect, whether occasioned by tumours, dropsical effusions, or by swellings of any kind. In cases of this description large muscles frequently become expanded, and reduced to a membrane.

24. *b. Hypertrophy* seldom occurs in the voluntary muscles, excepting as a consequence of active exercise, and it then cannot be considered as a morbid state. It is met with in the involuntary muscles, as in the structure of the heart, stomach, and urinary bladder, and is then owing to morbidly increased action. If ever observed under other circumstances in the muscles of the skeleton, it is merely apparent, and occasioned by the deposition of lymph or adventitious structures between the muscular fibres.

25. *c.* The *colour* of muscles varies exceedingly, according to the abundance of hæmatosine in the blood, and to the quantity of this fluid, which they may contain. When the muscles are congested with blood, as is frequently the case in persons dead from asphyxia, drunkenness, tetanus, sanguineous apoplexy, narcotic poisons, &c., they are usually of a deep red or dark colour, the blood in the vessels being semi-fluid. In inflammatory and pulmonary diseases, they are either red or purple-red; in typhus, pestilential cholera, plague, yellow fever, and other pestilential maladies, they are bluish-red, or of a very dusky red. In scorbutic persons they become, in places, of a dark brown colour. In all those diseases in which there is a deficiency of blood—in chlorosis, rickets, tubercular affections, dropsies, in many very fat or leucophlegmatic persons, and in visceral affections diminishing the assimilating processes, the muscles are more or less pale. When limbs have been disused, are lame, the joints anchylosed, &c., the muscles become not only atrophied, but also remarkably pale or even white. A pale state may also arise in muscles of the natural size, from great vascular depletion. Changes of texture are often attended with alteration in the colour; when the muscles are converted into fatty or adipocerous substance, when indurated from inflammation, and when affected with scirrhus, they often become unusually pale.

26. *d. Contractions* of muscles arise chiefly

from irritations affecting the origins of nerves supplying them, or certain parts of the encephalon in intimate correspondence with these nerves, or the ganglial nerves communicating with them. This alteration of muscles may also be connected with injury to, or with irritation or inflammation of, their tendons and aponeuroses. After long contraction, the muscle becomes atrophied, pale, and reduced to a state approaching to that of aponeurotic fibres. Remarkable contractions of the circular fibres of portions of the hollow viscera are sometimes found many hours after death, when these viscera have been shortly before dissolution the seat of severe irritation.

27. *B.* The *consistence* of muscles is extremely various.— *a.* Unusual *firmness* and *dryness* of the muscular tissue are sometimes met with in connection with change of texture, and more rarely without such change. Great firmness merely is generally attendant upon *contractions*, and these are associated with dryness, blanching, and some degree of atrophy when the contraction has been of some duration. Firmness and dryness, when considerable, are commonly local changes affecting chiefly muscles which have been long contracted, or pressed upon by swellings, tumours, &c. Isenflamm and Otto have, however, recorded instances in which the muscles were hard and dry throughout. These alterations are most frequently observed in very aged persons.

28. *b.* The consistence of muscles is often more or less *diminished* throughout, particularly in the advanced stage of adynamic, typhoid, and putro-adynamic fevers, in yellow fever, plague, scurvy, dropsy, and still more so in persons killed by lightning, or by a blow on the epigastric centre, also in cachectic diseases, and whenever the blood becomes vitiated by animal or other poisons. *Softness* and flabbiness in all these maladies are generally the results of impaired vital cohesion of the structure, and the colour of the muscles is, in these circumstances, generally deeper than natural, and is owing to the dark and morbid state of the blood. In tubercular and visceral diseases, in paralysis, certain chronic affections of the heart, in chorea, paralysis agitans, in lameness of limbs or anchyloses of joints, and in chlorosis and anæmia, the flabbiness or softness of the muscles is owing more to deficient circulation of blood in, and impaired nutrition of, the muscles, than to diminished cohesion; the muscles thus affected being of a pale, yellow, or fawn colour. Softness of muscles may be remarkable in the systems both of organic and animal life. I have met with it in both in all the diseases just enumerated, and even in the heart itself. I observed it in the heart associated with unusual pallor of the tissue in a case of chorea (see *Lond. Med. Repos.* vol. xv.). Softening sometimes occurs *locally* to a great extent in the vicinity of malignant affections, as in the lips and cheeks from watery cancer, and near carcinomatous and fungoid formations. In some marked cases of the kind, a large portion of muscle has been converted into a jelly-like, pulpy or fungous mass, constituting the *myomalaxia* of some authors.

29. *c. Fatty* or *adipocerous* degeneration of muscles.—*Myosteatosis, Myodemia* of Lobstein, and *steatosis* of Craigie — is rarely observed. In this state the fibrous structure of the part is entirely lost. Otto states that it occurs chiefly in the lower extremities after diseases of the knee-joint. In fat persons there seems to be an approach to this state, in the extreme paleness of the muscular fibres and the deposition of fat between them. This change has likewise been observed to occur in the heart by Laennec, Adams, Andral, and others.

30. *d. Fibrous, cartilaginous,* and *osseous transformations* of muscles are sometimes seen. Muscles which have been long retracted, particularly in old men, after rheumatism, often assume a *fibrous*, or even a *fibro-cartilaginous state.* M. Cruveilhier has found the muscles of the leg transformed to this state in a case of *elephantia.* A similar change may occur after fractures; the muscles nearest the fractured part being partially converted to a fibro-cartilaginous, a cartilaginous, and osseous structure, successively. Tavernier and Andral have observed ossification of muscles to a great extent. In most of the cases in which it has been seen, it has been limited to the cellular tissue between the larger fasciculi of fibres, or dipping into them from the fibro-serous expansions and aponeuroses, beneath which the ossific matter is deposited. As the osseous change proceeds the muscular fibres become atrophied, and they ultimately disappear. *Earthy* or *phosphatic concretions* are sometimes met with in the same situation, and in the cellular substance between the muscles, especially in gouty persons.

31. *e. Tubercular degeneration* is very rarely seen in muscles, and is met with only in the vicinity of scrofulous disease of the knee-joint, or of tubercular masses in the neck, arm-pit, mediastinum, &c.

32. *f. Malignant degenerations* of muscles are observed only secondarily. *Scirrhus* is thus met with, changing the muscular structure to a dense, whitish, fibrous substance, which subsequently runs into malignant ulceration. Cancer, in the *carcinomatous state,* and *medullary sarcoma* or *fungo-hæmatoid disease*, are sometimes found to invade the muscles, particularly the pectoral, to a considerable extent. *Melanoid formations* are also observed, but chiefly in the connecting cellular tissue.

33. *g.* Simple *cysts*, cysts containing *hydatids*, and others containing *small worms*, have been found in the substance of muscles. The former have been observed by Werner, Lobstein, Cruveilhier, and others; the last by Mr. Owen — the *trichinia spiralis* — who found this worm in subjects who had died of different diseases, of a low character.

34. *h. Fluids* are sometimes effused between the muscular fibres. These consist — 1. Of a *watery serum*, in some cases of dropsy and leucophlegmatia. 2. Of a *gelatinous matter*, infiltrated between the fasciculi and around the muscle, in acute rheumatism. 3. Of *puriform* or *sanious* matter, infiltrating the fasciculi of muscles, found only in rare instances, and in cases where puriform or ichorous fluids have been carried into the circulation from a distant situation; and — 4. Of *blood*. This last has been met with in various proportions, and has presented various appearances — fluid, semifluid, and dark, or almost black — in small specks, or ecchymoses, or in larger deposits. The effusion of blood between the muscular fibres has very rarely caused rupture of

them. To this alteration, the term *muscular apoplexy* has been applied by several French pathologists. It is very rarely met with in the voluntary muscles unless in scurvy and purpura hæmorrhagica. It is sometimes seen in the involuntary muscles, and even in the heart itself, after death from malignant, putrid, or pestilential fevers.

35. *i. Inflammation* and *obliteration of bloodvessels* are often followed by marked alterations of the muscles, which the diseased vessels supply. Thus, Cruveilhier and others have traced *phlebitis* from one of the principal veins of a limb to the branches proceeding from a muscle; purulent matter infiltrating it, and numerous small abscesses being interposed between its fasciculi. Obliteration of the bloodvessels is generally followed by *gangrene*, and particularly when the arteries are obliterated, unless a collateral circulation is formed. The gangrene following *ergotism* is chiefly occasioned in this way, although some change is also early produced by the morbid food on the nerves of the part. *Ulceration* rarely takes place in muscular structures, and chiefly in consequence of the pressure of tumours. In the involuntary organs it sometimes extends to and invades the muscular structure, in its progress from adjoining parts in which it has originated. *Malignant ulceration, softening*, and *destruction*, are often met with consecutively upon local malignant maladies, particularly in the pectoral muscles, and in the face.

36. *k.* The *physical and mechanical changes* to which muscles are liable consist of *rupture of their fibres, rupture of the aponeurotic envelopes*, or *luxations of muscles, wounds, contusions*, &c. The consideration of these does not fall within the scope of my work. I may, however, remark, that the *continuity* of the muscular tissue may be destroyed by external violence variously applied, by spontaneous rupture after antecedent softening, by suppuration and ulceration, and by violent involuntary contraction. When these accidents are not the result of previous organic change, they are generally repaired by means of a reddish jelly-like substance, poured out at the point of separation. This substance changes into a vascular and reddish cellular tissue, becomes subsequently compressed, of a lighter colour, more solid and less vascular, forming the medium of union between the divided parts, and restoring the continuity and functions of the injured muscle; but itself not consisting of true muscular tissue.

37. *l. Rupture of the fibres of a muscle* generally occurs upon any sudden, involuntary, or unconscious and violent contraction of it; is attended by extreme pain, sometimes by a crack or noise, and by inability to contract the muscle, each attempt to do so remarkably augmenting the suffering; and is followed by some swelling, and occasionally by ecchymosis. The *treatment* of these accidents consists of constant relaxation of the muscle, favoured by position, and of suitable bandaging of the part or of the limb, continued until reparation has taken place.

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NERVES.—Diseases of.—The various affections and structural lesions of nerves have been insufficiently investigated; and the existing state of knowledge respecting them is without precision — even as respects those which are the most frequently observed. Sciatica is a proof of this want of precise knowledge; for information is still required as to the state of the nerve in this affection. Cotugno, one of the earliest investigators of this complaint, imputed it to inflammation. This opinion was considered incorrect by later writers; and now it has been demonstrated, that certain states of sciatica actually proceed from inflammation of the sciatic nerve. In cases of morbid sensibility also of other nerves, it has not been shown whether the affection be functional merely, or whether it be really inflammatory, or dependent upon alteration of structure. And it is often difficult to determine how far the trunk of the nerve is implicated, or whether or not the affection proceeds entirely from disease at the origin of the nerve in which it is manifested. These remarks apply also to impaired or abolished function and sensibility of nerves. The real mischief may be seated at or near their origins, in their trunks, or in parts closely connected with either; and the same species of lesion, which, in either situation, may induce exaltation of sensibility or spasm, or convulsive actions of the muscles supplied by them, may in a higher grade produce loss of sensation, and in a still higher grade occasion loss of motion, or loss of either, or of both functions, according to the nature and precise seat of lesion. Since the researches of Sir C. Bell have appeared, some light has been thrown upon this department of pathology, still the light has been sufficient only to render our darkness more visible. In the brief account about to be given of diseases of nerves, I shall notice — *first*, the lesions of structure observed in them; — *secondly*, inflammations of nerves; — and, *thirdly*, morbid exaltations of sensibility, or neuralgic affections; certain other disorders of nerves being comprised under different appellations, as *paralysis*, &c.

I. STRUCTURAL CHANGES OF NERVES.

CLASSIF. — IV. CLASS, III. ORDER (*Author*).

1. There are few parts of the animal body less subject to organic lesion than the nerves, particularly those of voluntary motion; and the lesions most frequently observed in them are chiefly the results of inaction, or of disease in parts connected with their origins, or of inflammations of some portion of their trunks.

2. *A.* The *size of nerves* varies materially; and the change may be either original or acquired.—*a.* Congenital or original *smallness* is not infrequent, either in a simple state, or conjoined with other morbid changes. It is generally connected with absence or imperfection of the organ to which the nerves thus affected belong. In internal dropsy of the head and hydrencephalocele, the cerebral nerves, whilst within the skull, are often very thin, as are the spinal nerves in the vicinity of the tumour in *spina bifida*. — *b.* True *atrophy* of the nerves, wasting or acquired smallness, is generally met with in particular nerves; it is seldom or ever general, excepting in a very slight degree, in general emaciation, or in very old persons. In hemiplegic and paralytic persons, the nerves of the paralysed parts are seldom very remarkably smaller than those which are capable of conveying volition. The nerves, however, of the organs of sense waste, shorten, or lengthen, &c., as the cause and consequence of diseases impairing or abolishing the functions of these organs. This has been most commonly remarked in respect of the optic nerves, which, alone, or with the optic beds and quadrigeminal bodies, have been found atrophied. Wasting of nerves frequently arises from pressure of any kind, as that of tumours and collections of fluid, &c., and is sometimes connected with neuralgic and epileptic affections. Wasting of the trunks of the nervi vagi has been observed in consumption, and of the ganglial nerves supplying the organs of generation some time after the disappearance of the menses.

3. *c. Irregular increase of the size* of nerves is rarely congenital; but is sometimes met with as a consequence of inflammation, dropsy, cancer. In such cases, single nerves are only affected; but the increase of size is sometimes three or fourfold. The ganglia and sympathetic nerves are not infrequently enlarged. LAUMONIER, PINEL, ROMBERG, LOBSTEIN, and DUNCAN, have found them unusually large in idiots, hemicephalic monsters, and diabetic patients; but MECKEL and OTTO, in their dissections after death from those diseases, have not observed this appearance. Dr. R. LEE has demonstrated the remarkable enlargement of the uterine nerves upon conception and during pregnancy. (*Philos. Trans.* 1842.) *Thickening* of the nerves is not an unusual consequence of chronic inflammation of their sheath and the cellular tissue connecting their fibriles. In several cases of this description, the nerve assumes a yellowish or greyish-yellow colour. (§ 4.)

4. *B.* The nerves may also present *anomalies of form, position,* and *ramification.* These are too numerous, in respect of every nerve, to admit of particularising them.—*a.* Their *colour* varies with their structural changes. When atrophied or softened they usually lose their gloss and whiteness, become somewhat opaque, grey, or yellowish, or greyish-yellow. Contused or inflamed nerves are more or less red throughout, or spotted or streaked with red. In ulcers and gangrened parts, they are usually more or less discoloured. In complete atrophy, or near a cancerous part, they present various shades of brown or rust-colour. In jaundice, they very seldom participate in the general discolouration.

5. *C.* The *consistence of nerves* is sometimes either diminished or increased. — *a. Diminished consistence* is most common: instead of being firm and elastic, the nerve becomes soft, withered, or shrivelled, easily torn, and appears as if macerated. In some instances, their sheaths are of their natural firmness, but their fibriles seem loosened, and somewhat separated from each other. In other cases, the medullary part of the nerve is remarkably softened and discoloured, appearing as if it had been dissolved by a solution of a fixed alkali; and, in the more extreme cases, so completely disorganised as to run out upon the division of the nerve like a jelly, or even like water. This state is analogous to that described under the name of pulpy disorganisation of the medullary structure of the brain, and proceeds from the same causes, one of the chief being a high degree of inflammation. Softening of the nerves may also be conjoined to *atrophy.* The nerves, in some parts, are sometimes entirely deprived of medulla, the hollow sheaths alone remaining. This occurs chiefly within the skull and spine in children, with imperfect developement of the brain and water in the head, or with hydrencephalocele, and spina bifida.

6. *b. Induration* of nerves is a rarer occurrence than softening, and seems to be chiefly attributable to a state of chronic inflammation, causing the deposition of a plastic lymph in the cellular tissue connecting their fibriles and gluing them more firmly together. Induration may also be conjoined either with *atrophy* or with *hypertrophy* of the nerve. The medullary substance is never actually converted into cartilage or bone.

7. *D.* The *continuity of nerves* may be broken, as in external injuries, wounds, &c., by which they may be partially divided, torn asunder, contused, their fibriles forcibly separated, &c. —*a.* If they be stretched gradually, as by soft tumours, swellings, &c., they often yield remarkably without their functions being destroyed. But when suddenly and forcibly extended, as by hard tumours, aneurisms, dislocations, &c., they may be torn, although this can rarely happen, without breach of continuity in the surrounding or more superficial parts.—*b.* When a considerable nerve is *wounded*, neuralgic and sympathetic affections sometimes arise in addition to the necessary paralysing of the part which it supplies, and to the usual phenomena proceeding from such injuries, as redness, swelling, effusion of coagulable lymph and reunion. If a nerve be completely *divided*, both extremities swell, particularly the upper; the more distant or separated portion of nerve becomes somewhat thinner, and the lymph effused between the divided ends unites them both into a more or less large and solid knot, consisting of cellular tissue, into which new and irregularly disposed nervous threads are produced after some

time. There is no part of the soft solids which are more disposed to unite than nerves, even although the division has been made with loss of a considerable portion of the nerve, or their ends have been far removed; but the union is always made through the medium of a cellular tissue produced from the divided ends, into which medullary fibriles shoot irregularly some time afterwards. Even after amputation the divided extremities of different nerves will unite in this manner, forming a loop. When union does not take place, the divided ends cicatrise with a permanent swelling, with loss of motion and sensation of the part supplied by the divided nerve. After amputation the ends of the nerves appear swollen, inflamed, spotted or red, from the blood effused between their fibriles at the divided surface. This state subsides into a greyish, thick, firm, and fibrous-like knob, from which delicate nervous fibriles proceed, serving as nervous ramifications to the surface and divided parts.

8. *c. Contusion* of a nerve is followed by effects varying with the severity of the injury. When the contusion is slight, extravasation of blood in the cellular tissue connecting the nervous fibriles is the chief consequence; if it be more violent, the fibriles themselves may be crushed. In the first case, severe pain and numbness in the course of the injured nerve, and temporary or partial paralysis are the results, which generally cease after a time. In the second the effects are more severe, and the palsy more permanent.

9. *d. Punctures* are amongst the frequent injuries to which nerves are liable. They occasion extreme pain, which is often protracted long after the infliction of the injury, is extended in the course of the nerve, and is sometimes accompanied with spasms, tremors, or convulsive motions of the muscles supplied with the punctured nerve. Cases illustrative of this lesion have been recorded by Sabatier, Wilson, Swan, Bosquillon, and others. Punctures often occasion a circumscribed swelling of the nerve, with slight effusion of blood in the cellular tissue connecting the fibriles, and in the enveloping neurilema. It has been shown by Wolff, Descot, and Béclard, that, when the acute inflammatory symptoms consequent upon this injury have subsided, and when the effused fluids are absorbed, there still remains in the situation of the puncture a hard, opaque, and circumscribed enlargement, of a fibrous consistency, formed by a thickening of the cellulo-fibrous tissue of the nerve. This change in the part may occasion severe pains of the nerve, which may not be subdued until the nerve is divided in the situation of the puncture.

10. *e. Section of a nerve* may give rise to severe suffering, whether it be complete or incomplete. When the division is *incomplete*, severe pains, as in cases of puncture, are felt, and are remarkably increased by attempts to contract the muscles supplied with the partially divided nerve; perfect repose, appropriate bandaging, and, if these fail, complete division of the nerve, being the chief means of relief. *Complete* division of a nerve may occasion severe pain, which, however, is generally much less violent, or prolonged, than when the nerve is punctured or partially divided. When the section is complete, the acute pain attending it is instantly followed by insensibility and loss of motion of the parts supplied by the divided nerve; the divided ends of the nerve undergoing the changes described above (§ 7.).

11. *f. A ligature* drawn tightly around a nerve instantly produces effects analogous to division of it. After a time, the ligature occasions swellings above and below it, and close to it, that above being the greater. When the ligature causes division of the nerve, the ends remain in contact, surrounded by the inflamed cellular tissue, and by coagulable lymph, which soon becomes organised. Union takes place, as after division from a wound; but the enlargement, especially that which was above the ligature, still continues more or less. Ligature of nerves sometimes occasions very severe or even violent effects, but not so generally as commonly supposed.

12. *g. Wounds*, even when very small, occasion most severe effects when a portion of a foreign body remains imbedded in a nerve. Very interesting cases of this description have been published by Denmark, Jobert, Descot, Jeffreys, &c., in the works referred to in the Bibliography. These effects are especially severe when the wound has cicatrised, the foreign substance lodged in the nerve occasioning the most painful irritation in the course of the nerve and its ramifications, or violent neuralgia, with spasms of the muscles supplied by it. In some instances, tetanus has been the result.

13. *h.* A nerve may be involved in a *cicatrix* following a wound, amputation, or burn; and become the seat of intense pain or irritation, owing to its exposed, or insufficiently protected state. The actual or potential *cautery* — the latter even when performed with a caustic alkali,— may, either previously, or subsequently, to the cicatrisation of the part, occasion very severe effects when the branch of a nerve is involved in the injury. M. Frère (*Revue Méd.* Mai, 1839, p. 207.) has recorded an instance of an issue made by the caustic potash having thus been followed by severe local effects, which terminated in fatal tetanus. But this is a very rare, if not a singular occurrence.

14. *E. Lesions of nerves of a malignant nature* have not been satisfactorily observed; nor have they been found to form primarily in nerves. Otto and others have remarked, that the medulla has appeared more or less diseased in the vicinity of carcinomatous or cancerous swellings or ulcerations; the nerve being discoloured in parts, hardened, swollen, and knotty, and degenerated in its structure to a greater or less extent throughout, both in its sheath and medulla.

II. Inflammation of Nerves. — Syn. *Neuritis, Nervorum Inflammatio; Neurite*, Fr. *Die Nervenentzündung*, Germ.

Classif. — III. Class, I. Order (*Author*).

15. Defin. — *A violent, sharp, lacerating pain in the situation of a nerve, with a feeling of numbness, increased by slight pressure, and often attended by greater fulness than natural, sometimes by redness, in the course of the nerve, and by inflammatory or irritative fever.*

16. Inflammation of nerves has been generally passed over by writers on practical medicine. Boerhaave remarks: "Nemo forte unquam vidit inflammationem in nervo; hæc vero si contingat, in sola *tunica vaginali* hæret." (De Morb. Nerv., p. 265.). That the inflammation is seated chiefly in the neurilemma cannot be doubted;

but it is not the less an affection of the nerves; and that it is, in a most demonstrable shape, a not very infrequent disease, will be acknowledged by most experienced pathologists. Although it is not manifest that several affections of nerves, such as neuroma, cramps, partial loss of sensation, or of motion, sciatica, and the severe attacks of pain usually termed neuralgia, proceed from inflammation implicating a trunk or branch of a nerve, yet there is much reason to infer that such is actually the case in some instances, and more frequently than has been admitted, although the inflammation may not be seated or manifested exactly as it is in the more unequivocal instances of the disease to which the term has been generally conceded. It was contended by COTUGNO, with much reason, that the trunk of the sciatic nerve is always more or less inflamed in sciatica; and I will endeavour in the sequel to show that neuroma or painful tubercle is the consequence of a chronic inflammation of the sheaths of the nervous fibres, and of the connecting cellular tissue.

17. i. ACUTE INFLAMMATION OF NERVES. — *Neuritis acuta; Neurilemitis, neurilitis,* Auct. *Neurilemmatitis*, HILDENBRAND. — Acute neuritis is rarely met with in a primary or idiopathic form, or independently of wounds or external injuries; but not so rarely as was very generally supposed. The researches of MARTINET, GENDRIN, and DUGÈS, have shown that the changes in the nerve, in the idiopathic and traumatic forms of the disease are the same; and that these changes are not limited to the neurilemma, but extended to the nervous substance itself, which was found in several cases (MARTINET's 4th, 5th, 6th, and 10th cases), of a dark-red colour, softened, and even "injected by very manifest vessels." Indeed, as M. OLLIVIER has remarked, there is no reason that the nervous substance should be less capable of inflammation in its finer ramifications than in its central masses. However, it cannot be disputed, that the chief marks of inflammatory action are seated in the neurilemma. The differences in the symptoms caused by inflammation limited to the one, from those produced by inflammation extending to the other, have not been shown; although HILDENBRAND supposes, that when the pulp or substance of the nerve is affected — *neuromyelitis* — the symptoms are less acutely and distinctly evolved than in neurilemmatitis, and are attended by nervous symptoms indicating more acute sensibility, and greater disposition to spasm. This distinction is, however, extremely doubtful and imperfect; careful post-mortem investigation is required to elucidate this subject, but opportunities of determining it are very rarely afforded the pathologist.

18. *A.* The *symptoms* of acute neuritis are a lacerating, sharp, or lancinating pain in the situation of a principal nerve or branch of a nerve; attended by a sense of numbness, generally following the course of the nerve affected and of its branches; exacerbations of the pain after slight and variable remissions, and upon the slightest touch or pressure, or upon moving the muscles supplied by the affected nerve; and, in some cases, numbness, or partial or even complete palsy, of parts below the seat of pain, which in these also may be acute, remitting and lancinating. Even when the pain is most continued, the slightest touch may exasperate it; whilst very firm pressure above, but not upon, the affected part of the nerve, will assuage it. When the nerve is superficial, as in the extremities, a longitudinal swelling or hardness may be detected in the seat and course of the nerve. The heat of the part is increased, and a burning sensation is also often felt in it. The usual phenomena of symptomatic inflammatory or of irritative fever are generally present, in varying grades, according to the intensity of the local affection, the size of the nerve implicated, and the temperament, habit of body, and visceral conditions of the patient.

19. Neuritis sometimes occurs in the *puerperal state — Neuritis Puerperalis,* — and attacks chiefly either of the lower extremities soon after parturition. M. DUGÈS (*Rev. Méd.* Aout, 1824), first directed attention to the disease as it appears in this state; and since that time I have seen three or four cases of it. The first of these I attended in 1825 with my friend Dr. JOHN DAVIES, now of Hertford. It was complicated with both phlebitis and artereitis, and terminated in fatal gangrene of the whole limb; the nature of the disease being further shown by the examination after death. M. DUGÈS has endeavoured to distinguish *five varieties* of puerperal neuritis. 1. The simple or circumscribed. 2. The œdematous. 3. The phlegmonous. 4. The œdemato-phlegmonous; and — 5. The gangrenous. It is evident that these varieties are chiefly the result of the association of neuritis with inflammation of either the veins, the lymphatics, or the arteries; my own experience proving that these associations are even more frequent, in the puerperal state, than the simple form of the disease.

20. M. DUGÈS attributes the first or simple variety of puerperal neuritis to the pressure of the gravid uterus on the pelvic nerves. It is usually seated in the sciatic nerve; and occasions acute lancinating pain; and in the more severe cases to partial palsy of the limb. M. DUGÈS states that this variety is readily removed by warm baths; but the slighter cases which are thus remedied cannot amount to actual inflammation, or to any thing beyond congestion of the vessels of the nerve, or of the parts surrounding it. The presence of fever in connection with the pain in the nerve, is not, in the puerperal state, sufficient proof of the existence of inflammation, as in nervous and irritable females in this state, febrile commotion is often readily excited by pain.

21. The *phlegmonous variety* of M. DUGÈS is in all respects the same as the common form of the disease already described (§ 17.). He characterises it in the puerperal state nearly as follows: — 1. The pain follows the direction of the nerve, particularly the crural, or the more superficial nerves of the lower or upper extremities, and is more acute and insupportable than in other inflammations. 2. The swelling as well as the pain proceeds in the direction of the nerve, is dense, unequal, and precedes any external redness. 3. The pain and swelling in the seat of the nerve are of longer duration than in common phlegmon; the pain always precedes the swelling, and the chills and rigors accompanying their commencement are of longer duration, and more severe, and the consequent fever is more intense.

22. The varieties of neuritis which M. DUGÈS has denominated the *œdematous*, the *œdemato-phlegmonous* and the *gangrenous*, are complica-

tions, as I have above suggested, of neuritis with either phlebitis or artereitis, or both. In the case already alluded to (§ 18.), neuritis was associated with inflammation of both the veins and arteries.

23. *B.* The *diagnosis* of acute neuritis from *neuralgia* is often difficult. Some authors have supposed that the latter depends upon inflammation of the nerve; and it is not improbable that, in some of the cases characterised by a more or less persistent pain in the nerve, and by a limitation of the pain to a single nerve or its ramifications, some degree of inflammation may exist in a part of it, or at its origin. Generally, however, the presence of fever, of fixed and constant pain in the situation or course of a nerve, of tension, dense swelling, and tenderness on pressure, of partial palsy of, and increased pain on contracting, the muscles supplied with the affected nerve, &c., indicate inflammation; whilst the absence of fever, the erratic and intermittent character of the pain, its subsidence upon firm pressure, mark its dependence upon irritation in a related part, or upon some other cause.

24. *C.* The *appearances in fatal cases* consist chiefly of redness, more or less marked, of the affected nerve, proceeding from injection of the capillaries of the neurilemma, or of the cellular tissue connecting the fibriles; of minute punctiform and numerous ecchymoses; of sero-sanguineous, or even of puriform, infiltration of the fibro-cellular envelope. In addition to one or more of these changes, the size of the nerve is increased, most frequently without any appreciable change of consistence, but occasionally with more or less softening, of the affected part. BICHAT found numerous small varicose dilatations of the veins in the sciatic nerve of a person who had experienced severe pain in this nerve; and VAN DE KEER found the sciatic softened, to a deliquescent pulp, of a greyish dirty red colour, in the midst of which were hard granulations. The neurilemma was thickened, red interiorly, opaque and white externally, but granulated and more or less injected. These changes were manifestly consequent upon inflammation, and confirmatory of the opinion of COTUGNO, who attributed, too exclusively, sciatica to inflammation of the nerve.

25. ii. CHRONIC NEURITIS — *Neuritis diuturna* — in certain of its conditions or results, has not been satisfactorily elucidated. *Neuroma*, or the tumour which is sometimes found in a nerve, is undoubtedly a consequence of chronic inflammation of the tumified part, inasmuch as the changes observed in it are similar to those which result from chronic inflammation in other parts of a like structure. *Ulceration* may also be adduced; but it is very rarely observed — never, perhaps, limited to a nerve; and only when a nerve participates in the ulceration of surrounding parts. When this is the case, the suffering thereby occasioned may require the removal of the diseased portion of nerve, or its excision, as advised by M. OLLIVIER; and, in some extreme cases, when the bone becomes affected, or adjoining parts much disorganised, even the amputation of a limb may be rendered necessary, as in a case adduced by Mr. SWAN, in which the popliteal nerve and surrounding parts were extensively ulcerated, excision of a portion of the nerve having been found inefficacious.

26. *A.* The only *form*, or *result*, of chronic neuritis that has been satisfactorily investigated, is *neuroma*, or painful tumour of a nerve. Numerous writers have noticed this kind of tumour, and, amongst others, CAMPER, BOERHAAVE, GOOCH, HOME, SPANGENBERG, PETIT, CHAUSSIER, DELPECH, and MECKEL. But J. FRANK, ARONSSOHN, DESCOT, and W. WOOD, have more fully investigated its nature than other writers. M. ODIER, of Geneva, applied to it the term neuroma. A modification of the same disease, or painful tumours of the sub-cutaneous or smaller nerves, has been fully described by Mr. W. WOOD, under the name of "*painful sub-cutaneous tubercle.*" These tumours,—whether formed upon small sub-cutaneous nerves, or upon large or small nerves of the extremities or of the trunk,—are essentially the same, but vary in structure, size and appearance, with the activity or grade of vascular action which produced them, and with the particular tissue of the nerve that has been principally affected. The tumour is sometimes round, but more frequently oval or elliptical. Its size varies from that of a pea or bean to that of a turkey's egg, but it rarely exceeds that of a hen's egg. More than one tumour is often found in the same case. It is met with at all ages; but of sixteen cases, four were in persons above forty-six years of age, and twelve in persons under that age. Of twenty-four cases, fifteen were stated to have occurred in men, and six in women. The disease is met with chiefly in the trunks or larger branches of the nerves of the extremities, particularly the upper, and near the elbow-joint. It occasionally occurs in the internal parts of the body; and, if these parts, and the size and distribution of the nerves supplying them, admitted as readily of examination as the extremities, it might be found more frequently in them, constituting the cause of some painful internal complaints. Of the cases adduced by Mr. WOOD, sixteen were seated in the upper, and five in the lower extremities; one in the neck, one in the thoracic cavity, and one in several parts. When once formed, the tumour generally increases more or less rapidly, and is rarely much influenced by treatment, but it seldom attains a very considerable size under two or three years. It may, however, remain stationary as to bulk for a very considerable time. The sub-cutaneous tubercle is particularly slow in its growth, rarely attaining a greater size than that of a bean, and often remaining without increase of bulk for several years.

27. *a.* The *diagnosis* of neuroma when superficial is not difficult. The tumour is most frequently hard and firm to the touch, occasionally elastic, and admits of motion in a lateral direction, but not upwards or downwards, or in the direction of the nerve. The skin is moveable over it, and is natural in appearance. When it is very large, the cutaneous vessels, particularly the veins, are enlarged, and the skin is somewhat livid in rare instances. The tumour is extremely painful on the slightest pressure; the pain extending to the parts supplied by the nerve — to the ring and little finger when the ulnar nerve is the seat of the disease. If a blow is received on it, the pain darts through different parts of the body. In three cases, referred to in the references, epileptic fits were distinctly caused by these tumours, and were cured, in two of them, when the tumours were

removed. In some instances the pain is not severe when the parts are kept at rest; but, in most, tickling or tingling, creeping or numbing sensations, or a combination of these, are felt in parts near or below the tumour; and, in many, a most excruciating pain, independent of, but much increased by pressure, exacerbated at intervals, is complained of at a distance from it, but in the direction of the trunk or branches of the nerve affected. The powers of sensation and of motion are, however, seldom impaired, but motion aggravates or brings on the pain; and prickling, accompanied or alternated with numbness, is felt in the limb, and severe pains dart in the direction of the nervous branches. In the smaller forms of the disease, which Mr. W. Wood denominates "painful sub-cutaneous tubercle," paroxysms of pain occur often without any apparent cause, and after irregular intervals, occasionally of some weeks' duration. In most instances, the severity of pain produced by pressure, the extension of it in the course of the nerve, the lancinating pains associated with numbness, and the increased suffering caused by attempting motion of the tumour in the direction of the nerve, of which it does not admit, are sufficiently diagnostic of the nature of the disease.

28. *b.* Tumours of the nerves, when carefully *examined* after death, or after removal by operation, present different appearances in different cases, owing probably to the originating seat of the disease, and to the state and progress of it. Mr. W. Wood remarks, that it is often difficult to determine in what particular tissue the diseased action had commenced. In some cases this action appears to have begun in the cellular tissue in the proximity of the nerve, to which it had gradually extended, so that, in its progress, the nerve and its coverings had become completely involved in the disease; but, unless tumours which commence externally to the sheath of the nerve shall implicate the nerve itself, they cannot be considered as cases of neuroma. I believe, however, that the diseased action under consideration commences most frequently in the neurilemma, forming the external sheath of the nerve or its connecting cellular tissue; or in the minute processes of neurilemma sent off from the general sheath to envelope the several nervous fibriles which form the nerve. In rare cases, the tumour consists chiefly of a cyst containing a fluid; in other cases, it is partly solid and partly fluid; but much more frequently it is solid throughout. The solid part assumes different degrees of consistency, and presents a different colour and appearance in different cases, and even in different parts of the same tumour. In some, the whole mass is firm, of a whitish or yellowish colour, and of a fibro-cartilaginous appearance, very much like nerve, but harder, and somewhat more shining; the fibres running either in a serpentine or parallel manner, with interlacing fibres. In others, one part is firm and of a reddish colour, and another part is cellular, the cells varying in size, and some being empty and others containing a fluid or a soft medullary-like substance. Others again consist of a number of small lobes, closely pressed and connected with the diseased nerve. Some are fatty, or tubercular, or consist chiefly of coagulated albumen. Nearly all present the appearance of having a firm, dense sac, shining externally, and seemingly formed of the altered neurilemma. This covering is either loosely or very intimately attached to the contained parts by cellular tissue.

29. The nerve is sometimes sound as it enters, or emerges from, the tumour; but it is oftener more or less diseased for a little distance above and below, being somewhat redder than natural, and thickened. The nerve can be traced distinctly to the diseased part, where the fasciculi, being separated from each other, run into the substance of the tumour, where they are either lost, or traceable through it, or near its surface. When, however, the tumour is very large, the nervous fibres often cannot be traced through it; they being so completely altered, or atrophied, or entirely removed by the morbid deposition, or hypertrophy of certain elementary parts of the mass. Some writers have considered this tumour of nerves as being of a scirrhous or cancerous nature; but that such is not the case is proved by the circumstances — 1. of its not invading the adjoining tissues nor implicating the skin, however large it may be, or however long it may have existed — 2. of the complaint not returning when the tumour has been removed.

30. *B.* These tumours sometimes closely resemble the oval tumours which often form on the extremity of a nerve after amputation. These latter tumours are frequently three or four times as large as the nerve on which they form, but of the same colour, of a firmer consistence, and of a different structure. The texture of the tumour is fibro-cellular, and dense, in which the nervous filaments lose themselves or become indistinct, probably by being wasted in proportion to the hypertrophy and induration of the cellular tissue of the affected part of the nerve, manifestly the result of chronic irritation or inflammation.

31. *C.* In some cases, consequent upon chronic inflammation, the cellular tissue forming the nervous sheath, and connecting the nervous fibriles, has been found infiltrated with serum, lymph, or sero-albuminous or sanguineous fluid, and rarely with purulent matter unless in acute or sub-acute cases. These changes have been observed chiefly in the ischiatic and other large nerves. Bony and earthy concretions have in rare instances been found in the cellular tissue connecting the nervous fibriles, but exterior to the medullary matter. These have probably resulted from a state of chronic inflammation, or have been the residua after partial absorption of morbid deposits.

32. *D.* Inflammation and its consequences may occur in either the cerebro-spinal or the ganglial or soft nerves, probably in the latter more frequently than in the former, but, owing to the situation of the ganglial nerves, and the marked peculiarities of their structures, either escape detection, or give rise to different phenomena and to different lesions in them from those observed in the cerebro-spinal nerves. When the ganglial nerves are inflamed, they are generally enlarged, of a lively or deep red; sometimes softened, and occasionally firmer than natural. These are the only changes in this particular class of nerves which I have observed.

33. iii. THE CAUSES of acute and chronic neuritis are chiefly those productive of inflammations of other tissues and organs. The circumstances

which *predispose* to the disease have not been fully elucidated, owing to the infrequency of it, and to its being confounded with other maladies, as with rheumatism, neuralgia, &c. My own observation induces me to infer that all lowering influences, copious hæmorrhages, prolonged pressure, and vicissitudes of temperature, humidity, and electrical states, of the air, both favour and more directly produce it, particularly when aided by the application of cold in any form, by wet or damp clothes, by sitting or lying on the ground, or on cold stones, or on damp seats or couches, by exposure to malaria, or to foul air, or other contaminating agents, by inordinate exertion, by suppression of accustomed discharges, by injuries, wounds, bruises, contusions, sprains, or operations, and by any local source of irritation. The idiopathic form of neuritis is occasioned chiefly by the same causes that give rise to rheumatism. The puerperal state certainly favours the developement of it, in its severest forms; the circumstances which are most efficient in causing it being then frequently in concurrent operation, particularly soon after delivery, when it may be complicated with phlebitis, and even also with artereitis, as in the case above alluded to (18.).

34. iv. THE PROGNOSIS in neuritis depends chiefly upon the circumstances in which it occurs. In the puerperal state, or when associated with inflammation of either of the circulating systems, it is a serious and even dangerous disease; the latter chiefly on account of the complication, and the exhausted or otherwise diseased state of the patient. The prognosis should be equally unfavourable if it occur in the course of fevers, or in connection with other maladies, or even in a bad habit of body, in all which circumstances it is most apt to appear. In a large proportion of the cases recorded by MM. MARTINET, DUGÈS, and others, the disease, in its acute form, terminated fatally when it thus appeared; the inflamed portion of nerve being either injected, enlarged, red, softened or infiltrated with serum or with puriform matter (§ 23.) The simple or uncomplicated disease, occurring in a previously healthy person, and the chronic form, especially in the state of neuroma, and admitting of an operation, is most frequently removed by judicious treatment.

35. v. TREATMENT.—*a*. My own experience leads me to agree with the remark of HILDENBRAND, that acute neuritis is never resolved by a recourse to bloodletting and antiphlogistics alone. That local bloodletting — much more rarely, general bloodletting — is required, according to the circumstances of the case and of the patient, is admitted; but additional means are also required, and should be adapted to these circumstances. Local depletions and fomentations; the more chologogue purgatives, as calomel, &c.; and anodynes, particularly opiates with calomel and camphor, or with the acetate of lead, or with the oxyde of bismuth; are most applicable to the more sthenically acute cases: but when the disease is associated with other serious maladies, or when it occurs in a cachectic state of the frame, or with asthenic characters, actively restorative agents are generally then required, even whilst local depletions and anodyne fomentations are being employed; and, in some cases, they should be most energetically prescribed in order to be successful, and be combined with the most powerful narcotics, the functions of the several emunctories being at the same time duly promoted, and morbid or effœte matters eliminated from the circulating fluids.

36. *b*. If the disease pass into, or primarily assume, a *chronic state*, alteratives conjoined with tonics, as the preparations of cinchona with alkaline carbonates or the liquor potassæ, and iodide of potassium; camphor with opium, or with the extract of aconite; blisters in the course of the diseased nerve, if it be deep-seated, and kept discharging for some time, and stimulating and alterative embrocations (F. 296. 311.), appear to be most successful. To some of these chronic cases, the treatment advised for *neuralgia* may be of service.

37. *c*. In cases of *neuroma* and painful subcutaneous tubercle these means will generally fail, and even the narcotic alkaloids applied locally are not more serviceable. In these cases, the extirpation of the tumour becomes necessary; and even, in certain circumstances, amputation of a limb may be required. Mr. WOOD states, that in twenty-four cases of neuroma, the following were the results: — in eight cases the tumour was successfully excised; in two, the patients died after the operation; in four, amputation was successfully performed; in three, no operation was attempted; in three, the tumours were accidentally met with on dissection; in two, the disease was seated in internal parts of the body; in one, the tumour was laid open in order to bring on suppuration, but the patient died of quotidian intermittent; and in one, the disease was cured by destruction of the nerve by caustic.

38. III. LESIONS OF SENSIBILITY AND FUNCTION constitute the third class into which the diseases of nerves may be divided. As the principal part of alterations of sensibility, or that consisting of morbid exaltation of sensation, has very generally had the term *neuralgia* imposed upon it, and as this morbid condition has been usually discussed under this name, it may be considered in a separate article, without the relation between it and other diseases of the nervous system being in any way interrupted by this mode of treating it. And as those painful affections of nerves which have been considered to exist independently of inflammations, and to which the name neuralgia has been given, are somewhat diversified in character and severity, the more general appellation of NEURALGIC AFFECTIONS may be applied to them. The disorders of function to which nerves are liable, especially losses of the powers of transmitting sensation and volition, and their agency in producing spasms, &c., being more advantageously treated of in connection with other and very intimately related lesions, are therefore comprised in those articles that are devoted to the consideration of diseases which are thus characterised, and which chiefly consist of losses and of exaltations of sensation and of muscular contractions, or of impairment or irregularity of sensation and motion. (See art. PARALYSIS, CHOREA, CONVULSIONS, IRRITATION, HYSTERIC AFFECTIONS, &c.)

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NEURALGIC AFFECTIONS. — SYN. *Neuralgia* (from *νεῦρον*, a nerve, and *ἄλγεω*, I suffer pain). *Neuralgia faciei*, *Prosopalpia*, Swediaur. *Hemicrania idiopathica*; *Trismus maxillaris*, Auct. *Trismus dolorificus*, Sauvages. *Rheumatismus spurius nervosus*, Most. *Autalgia dolorosa*, Young. *Dolor Faciei crucians*, Fothergill. *Dolor Faciei Fothergillii*, Auct. Var. *Neuralgia*, Chaussier, Good, and others. *Neuralgie*, *Tic Douloureux*, Fr. *Nervenschmerz*, *Nervöses Reissen*, *Antlizschmerz*, *Gesichtsschmerz*, Germ. *Neuralgia*, Ital. *Excruciating nervous pain.*

CLASSIF. — IV. CLASS. II. ORDER (*Good*). — II. CLASS. III. ORDER (*Author*).

1. DEFIN. — *Violent pain seated in the trunk or branch of a nerve, occurring in paroxysms of irregular duration, and after either irregular or regular intervals.*

2. Neuralgic affections were confounded by the ancient and older writers with tooth-ach, rheumatism, gout, &c., according to the seat of suffering. COTUGNO, FOTHERGILL, ANDRÉ, PUJOL, FORTSMANN, and CHAUSSIER, were amongst the first who directed attention to these affections with precision, and distinguished them from the disorders with which they had been formerly confounded. Since the commencement of the present century several writers in this country and on the continent of Europe (see BIBLIOG. AND REFER.) have advanced still further our knowledge of this subject. At first the study of neuralgia was confined to the occurrence of it in the nerves of the face and lower extremities, and the terms neuralgia and tic douloureux were applied only to the most excruciating states of pain experienced in these parts; but more recently these terms, or a qualitative one, implying very close resemblance, as neuralgic affection, &c., have been extended to all morbid exaltations of sensibility in parts not manifestly inflamed; so that they have been made to comprise, by French pathologists in particular, disorders formerly very differently named, and seated in internal viscera.

3. That morbid exaltations of sensibility, independent of inflammation, in a recognisable form, occasionally affect internal organs, cannot be doubted, and that they are quite as often seated in the ramifications of the organic or ganglial nerves, as in the cerebro-spinal nerves, is equally evident to the close observer, although their characters may vary with the difference of seat; and that they actually do thus vary in character is well known. The pain experienced during a paroxysm of neuralgia in one of the branches of the fifth pair of nerves, however excruciating, is not attended by that intolerable feeling approaching almost to vital extinction, which characterises those pains in internal or vital organs, that have been more recently termed neuralgic, that formerly had different names imposed on them, but that, however named or described, undoubtedly belong to the category of *neuralgic affections*. Therefore I shall comprise under this head, as succinctly as may be compatible with a due discussion of the subject, all those very painful disorders, wherever seated, which are apparently unconnected with inflammation, and which are not the result of some important or recognisable lesion.

4. According to this view, as well as to the mode of considering the subject, adopted by some

recent writers, several disorders, particularly toothach, headach, the different forms of colic, certain manifestations of hysteria, &c., might with propriety be considered as forms of visceral neuralgia; but these disorders, as well as some others, which have actually been thus viewed by a few of these writers, are generally so intimately connected with some more tangible or recognisable mischief, and so dependent upon it, that the propriety of retaining the old appellations, whilst we acknowledge the pathological relation they have insisted on, remains unaffected by the more partial view entertained by them. In naming and arranging, as well as in discussing, these and other disorders, prominent phenomena should not alone be noted, to the neglect of other important, although more latent morbid relations, but all sides of the subject ought to be duly viewed.

5. I. GENERAL CHARACTERS OF NEURALGIA. — The pain of neuralgic affections sometimes is slight and obtuse at its commencement, and augments in violence with more or less rapidity, becoming sharp, lacerating, darting or lancinating and being attended by excessively acute, constrictive, or plunging sensations, which at short intervals dart through the pained part — the *fulgura doloris* of COTUGNO. More frequently the pain is sudden in its accession, and it is occasionally preceded by an itching or heat in the part, or by numbness and pricking sensations, or by slight and fugitive pains, either or most of which may recur during the remissions between the more violent paroxysms. In some cases, the attack of neuralgia is preceded by nausea and general disorder, with more or less of derangement of the digestive and biliary organs; and in others, by anxiety at the præcordia, by slight dyspnœa, or by slight chills followed by heat. At the commencement the pain is attended by numbness or torpor and formication; and it is commonly lancinating or darting, although sometimes pulsative, or acutely smarting or burning. Whatever character the pain may assume, it is often instantaneous in its occurrence and disappearance — resembling a shock of electricity. It is frequently confined to the trunk of the nerve, but as often it extends itself to the ramifications, and even to the terminations of the nerve. More rarely it extends from the ramifications to the trunk. Sometimes it affects only a few of the branches, or even one or two merely of the fibriles. Accompanying the pain, especially during its greatest intensity, other phenomena are observable: tremors, spasms, cramps, or convulsive motions of the muscles connected with the affected nerves; general exaltation of sensibility, with restlessness and agitation; sometimes a tetanic rigidity of the muscles; and more rarely an inability of contracting them, with loss of sensibility towards the surface. Generally, neither redness, heat, nor swelling of the part can be detected. Occasionally, however, the arteries in the vicinity pulsate more strongly, and the veins are somewhat distended. M. OLLIVIER states that he has observed, in a few instances, where the nerve was superficial, that its volume was somewhat increased. These were doubtless cases of *neuritis*, which has very generally been confounded with *neuralgia*, and to which the latter is probably more frequently owing than is generally supposed, or than can well be demonstrated; for neither swelling, heat, nor redness attends neuralgia, but they all accompany and indicate neuritis; still they are so limited in extent and amount, when inflammation is confined to a nerve, as hardly to admit of appreciation or detection during an examination of the surface of the part affected.

6. The *duration* and *return* of the paroxysms are extremely variable. Sometimes the affection is intermittent, at other times only remittent; the attacks occurring after irregular, and much more rarely after regular, intervals. Some authors have supposed, from this latter circumstance, and certain of them, even although the intervals may be of irregular or prolonged duration, that the disease is a local or masked ague, originating in such cases in malaria. Often when the paroxysms become more frequent, they become also more violent, and sometimes of longer duration. When the attack is very sudden it frequently continues without abatement for an indefinite, but generally short period, and then as suddenly ceases. The most intense attacks are often of the shortest duration, but generally they vary from two or three minutes to several hours. When they continue much longer, the intensity of the pain varies, and slight remissions, with acute, lancinating, constrictive or lacerating pangs dart through the part like shocks of electricity, occasioning irregular spasms or twitchings of the muscles, and intense suffering. A critical evacuation, as hæmorrhages, particularly epistaxis, menorrhagia, hæmorrhoidal discharges, salivation, cutaneous eruptions, an abundant general or local sweat, or a copious discharge of the lochia or of urine, bilious or mucous diarrhœa, the formation of an abscess, discharges from the ear or from its vicinity, or a regular attack of gout or rheumatism, or prolonged exertion, attended by a copious and sustained perspiration, sometimes are observed, and serve to account for the sudden or even for the more gradual cessation of suffering.

7. The accessions of the attack often cannot be attributed to any appreciable cause; but more frequently they are occasioned by overloading the stomach; by neglect of the biliary functions, and of the states of the bowels; by excesses in the use of intoxicating liquors; by exposure to cold, damp, humidity, or malaria; by injurious over-exertion, &c.; or by any of the remote causes of the complaint acting even slightly or inappreciably.

8. In comparatively few cases is the health quite restored at the end of the paroxysms, or during the interval; for more or less disorder of the digestive or biliary organs may be detected in the great majority of them, with impaired tone of the organic nervous system, and general lassitude or debility, although the patient may seem quite well in the intervals, and be able, with few interruptions, to pursue his usual avocations. In many, more or less uneasiness, numbness, prickings, soreness, smartings, or sudden but momentary pangs, are felt at times in the part between the more severe paroxysms; and in some the general health, or the digestive organs, betray more or less marked disorder.

9. As to the *duration of the disease*, it is impossible to state any thing with precision. A person who has once suffered an attack is liable to a return of it, although he may have been completely restored; and a return or returns of it may take place in a short time, or not till after

many months or even years. As respects the paroxysms, it is an *acute* malady; but as regards the repetition of them, the liability to their return, or even their actual recurrence, it is generally a *chronic* and most prolonged disease.

10. II. SPECIAL NOTICES OF NEURALGIA.—Neuralgia may affect the nerves of the head, trunk or extremities, particularly those which are seated superficially, or are most exposed, and surrounded by loose cellular tissue; it may affect also the visceral nerves, as the nerves of the heart, of the diaphragm, of the liver, spleen, stomach, bowels, uterus, kidneys, &c., giving rise to those affections which have been usually named *angina pectoris, syncope anginosa, gastralgia, gastrodynia, colic, ileus, hepatalgia, nephralgia,* certain states of *hysteria,* of *hypochondriasis,* &c., all which are noticed either under their specific appellations, or under the viscera in which they appear to be chiefly seated. Of all the *special forms* or *seats of neuralgia,* those affecting the *face* and *head* are the most severe, frequent, and important.

11. i. FACIAL NEURALGIA.—*Neuralgia Faciei.*—*Tic Douloureux.*—It is more easy to say what this affection is not, than what it is. It is not, as M. BERARD has remarked, acute neuritis, nor chronic inflammation, nor any structural change, of the nerve; and, although various lesions have been detected in connection with this affection, these have rarely been observed in the nerve itself, and are neither so constant in occurrence, nor so uniform in character, as to account for it. The pathological and symptomatic phenomena of the complaint can only be stated in connection with the morbid exaltation of sensibility which constitutes it; and this lesion of sensibility cannot be otherwise defined, than as *a pain varying in its character, always excessive, generally intermittent, returning sometimes at regular intervals, but more frequently after irregular periods; seated in one of the branches of nerves of the face, and extending in various directions through certain of their ramifications; existing without evidence of inflammation or of fever; and, although occasionally connected with organic changes in some part related to the affected nerve, yet as often occurring without such morbid relations, or without any obvious connection with them in some cases where they are found to exist.*

12. *a.* Although *tic douloureux* was not described by the ancients as a distinct affection, it was certainly known to them, but confounded with various forms of headache; and as such it was described by ARETÆUS (see *De Caus. et Sig. Diuturn.* l. i. cap. 2.). It was first described as a distinct affection, and the name "*tic douloureux*" given to it, by M. ANDRÉ, of Versailles. Very soon afterwards Dr. FOTHERGILL published an account of it in the *Medical Observations and Inquiries.* Since then it has received the various appellations above stated as synonymes of neuralgia in the generic acceptation of the word. That Tic is an affection of a nerve, numerous considerations and proofs sufficiently demonstrate; and that it is seated in some one or more of the ramifications of the *trifacial* or fifth pair, is also proved by the seat, direction, and phenomena of the affection. The researches of Sir C. BELL, SHAW, MAGENDIE, MAYO, &c., have shown this nerve to be chiefly, if not entirely, a nerve of sensation; and the ramification of its principal branches from a large ganglion, the Casserian, further proves this to be its chief function, and demonstrates its relations to the ganglionic system. That a morbid exaltation of sensibility should, therefore, more frequently occur in the more superficial ramifications of a nerve whose office it is to transmit sensations from the face to the brain, these ramifications being the most exposed of any to vicissitudes of temperature, weather, &c. than in any other nerve, may be readily admitted, and explained by this circumstance. The experiments of Professor RIBERI on the frontal branch of this nerve, further illustrate this fact, and prove that the facial or seventh pair of nerves is not the seat of this affection. Not only is this shown by the seat of the pain, but by the experiments of the physiologists just mentioned, and by those made by FODERA, BURDACH, SCHŒPF, BUCKER, and ESCHRICHT.

13. Admitting, therefore, that the ramifications of the trifacial nerve are generally the seats of tic, or neuralgia of the face, the question may still be asked, are the branches of the facial or seventh pair ever similarly affected? The free inosculations of the branches of the one nerve with those of the other, and the consequent extension and direction of suffering, render it very difficult to prove an affection of the latter nerve. Still, although pure tic may never be seated in the facial or seventh pair of nerves, inflammation, or any powerful source of irritation, may excite a most intense pain in the trunk and principal branches of this nerve closely resembling tic, although more closely allied to the more diffused neuralgic pains occasionally affecting other situations. HALLIDAY and CHAPONNIERE have adduced cases which they believed to be neuralgia of the seventh pair: and within a few months of the period in which this was written, I attended a patient suffering neuralgia of this nerve, the pain extending to the whole side of the face, and to the neck and occiput. The affection was evidently seated in this nerve, but was considered as inflammatory, and treated by local depletions and blisters to the nape of the neck, which permanently removed it. M. BERARD has seen neuralgia of the second cervical nerve. I have been, during the last few years, consulted respecting three remarkable cases of neuralgia of the nerves of one side of the head, extending from the occiput to the forehead and vertex: one was sent to me from *Mons,* and another from *St. Omer.* It was difficult to determine in these cases which of the nerves supplying this part was the seat of the disease; but the facial, and branches of the first and second cervical were considered as chiefly implicated. In these, the attacks continued on each occasion from two or three to several hours, with the most agonising exacerbations, and were ushered in, in one case with vomiting, by horripilations, and a free discharge of pale urine. In another case, the attacks frequently commenced in the night or early in the morning, and were kept off during many months by the treatment about to be recommended.

14. *b. The Symptoms* of Tic are chiefly the intensity and paroxysmal nature of the pain constituting it. The pain occurs, or is exacerbated, in fits; the succession of a various number of fits constitutes an *attack,* which may be of uncer-

tain duration, and leave the patient comparatively well in the intervals, which also are of uncertain continuance. The accession of the fits is generally sudden, but is often preceded by various indications of its approach, as itching of the nose, sneezing, tickling, pricking or coldness, creepings or formication, &c. in the part about to be affected. In some cases it is preceded or attended by an abundant discharge of urine, by horripilations or pandiculations, especially when the complaint assumes a regular or periodic character. After these precursors, or independently of them, the pain darts through one or more ramifications of nerves, and either instantly, like a shock of electricity, or very rapidly, acquires its utmost intensity. The pain is most acute, burning, tensitive, pungent, stabbing, lacerating, &c. (§ 5.), and so poignant as to excite the agonising cries of the patient. The pain has been so intolerable as to cause the patient to terminate his existence (Duval). The suffering is generally referred to one of the branches of the trifacial nerve, and darts along the minute ramifications, but it is not always so limited to a branch or fibrile as to admit of its precise seat or source being indicated. It sometimes radiates in several directions, and seldom is concentrated in one point without extending in the direction of the smaller branches. In the great majority of instances, tic douloureux is limited to one or other of the three branches of the fifth pair of nerves, but it occurs probably more frequently in either the ophthalmic or the superior maxillary branch than in the inferior maxillary. When it is seated in the first or ophthalmic branch, the frontal ramification of it is oftener affected than the lachrymal or nasal; but in rare cases it extends to two or all of these ramifications in the same case; and often when the frontal nerve is affected, an abundant secretion of tears takes place, or pain is felt in the eye, and sometimes uneasy sensations are experienced in the side of the nose, with dryness, itching, &c.

15. When the *second* or superior maxillary branch of the trifacial is the seat of suffering, the infra-orbital is the part most commonly affected, although the pain may extend more or less to the other ramifications of the maxillary. Generally the pain is referred to the infra-orbital nerve as it passes from the foramen, or proceeds from it to be expressed upon the upper lip, ala of the nose and gum. It sometimes affects the posterior dental ramification, and resembles a severe attack of tooth-ache. It more rarely is seated in the extreme branches supplying the pillars of the fauces and adjoining parts, in which, however, I have observed one instance.

16. Tic douloureux of the *third* branch is generally seated in the inferior dental nerve, and particularly its mental portion as it emerges from the mental foramen, extending to the inferior lip. In some instances the pain affects the branch which the inferior maxillary branch sends to the seventh pair; and when this is the case the affection appears to implicate the latter nerve. In others, the tic is seated in the anterior auricular branch, the pain extending to the temple in the course of the temporal artery. In very rare instances it is seated in the lingual branch of the inferior maxillary. Of this variety I have met with one case, in a female about fifty years of age.

17. *c.* Neuralgia faciei may thus be divided into *frontal*, *infra-orbital*, and *mental*, according to its common seat, the other ramifications of the three principal branches of the fifth pair being much more rarely affected. Whatever variations the complaint may present, the pain rarely or never passes from one side of the face to the other; and as seldom has it been observed to exist in both sides at the same time: of this latter occurrence however, Frank, in his extensive experience, met with two instances. During the neuralgic paroxysm, the muscles of the face are often contracted, so as to give the countenance most singular expressions; but the muscles of the unaffected side are rarely or never similarly affected. The least motion or noise occasionally aggravates the pain, and when the ophthalmic branch is the seat of the complaint, a strong light has generally the same effect. On examining the seat of suffering, little or no alteration can be detected, beyond a slight blush occasionally of the surface, or a little redness of the conjunctiva, when the first branch is affected, and a somewhat stronger or fuller pulsation of the arteries going to the affected parts; but there is no febrile commotion of the system, nor acceleration of pulse, which often beats slower than usual during the fit.

18. *d.* The duration of the fit varies from less than a minute to one, two, or several minutes, or to a quarter or half an hour, or even longer. The severer the complaint becomes, the longer are the attacks. The termination of the fits are often as sudden as the commencement, and sometimes more so; and in some cases, particularly of frontal neuralgia, a copious discharge of tears or of mucus from the nostril attends it, and seems to be critical; but occasionally the fit subsides more gradually. Some cases of tic are irregular, or *atypetic*, in respect of the intervals between the paroxysms, whilst others are periodic, and resemble a masked intermittent. The most trivial circumstance, or the slightest vicissitudes of temperature, a moral emotion, or exposure to the air, &c., will often suffice to bring on a fit. According to Frank, the attack takes place more frequently during the day than night.

19. *e.* The whole *duration* of the complaint may be very long. It may cease for months or even years, and return in a more severe form than before, generally in the same branch of the trifacial as before, but sometimes in another branch of this nerve. In some instances the fits become more frequent with the duration of the complaint. An increased severity or frequency of the attacks is generally followed by a failure of the general health, and by more or less emaciation, owing to want of sleep, anxiety, and dread of the recurrence of the fits, and impairment of the digestive, assimilating, and excreting functions.

20. ii. Toothach.—*Odontalgia.* — *Dolor Dentium.*— *Odontalgie, Douleur de Dent*, Fr. — *Der Zahnschmerz*, Germ.—*Odontalgia, Dolor di Denti*, Ital.—Toothach is undoubtedly a variety of neuralgia, although it may be more frequently referred, than any other variety of the complaint, to some source of irritation in one or more teeth, or in the gums or antrum. Yet, even without these obvious causes, and often when they very prominently exist, an attack of toothach is often brought on by the same causes as those which produce the other forms of neuralgia (§§ 52, *et seq.*).

the local sources of irritation being often insufficient to develope this morbid effect, until aided by other agents or influences.

21. *Odontalgia* may be divided into — 1st, The *inflammatory*, or that caused by inflammation of one or more of the constituent structures or tissues of the teeth; 2d. The *ulcerative or carious*, or that caused by ulceration or caries of a tooth, and consequent exposure or irritation of a nervous fibrile; — 3d, The *nervous*, or neuralgia of the nerves supplying the teeth and gums, independently of inflammation or caries of a tooth — *neuralgia dentalis*. Besides these varieties, toothach may proceed from inflammation or abscess of the gum or in the antrum, from caries of a portion of the alveolar processes or of the upper or lower jaw, from fungus, exostosis, or other growths, on the root of a tooth, from retention of one of the first set, and from a wrong direction being given to one or more of the second set. It may affect, moreover, the *gouty* or *rheumatic diathesis*, and thereby assume a modified or more extended form; and it may be developed by exposure to cold, malaria, &c., and be characterised accordingly.

22. There can be no doubt that, even when the most energetic of these sources of irritation are present, little or no pain or uneasiness is sometimes felt, until disorder of the digestive organs occurs — until the functions of the stomach, duodenum, or intestines are deranged, either by improper ingesta, or by morbid secretions poured into or accumulated in them; or until bile collects to an injurious amount in the gall-bladder and ducts, and depresses the organic nervous influence. When, however, these disorders of the digestive organs occur, the affection of the dental nerves is developed, particularly in those parts more immediately irritated; and as soon as those disorders are removed, or morbid matters evacuated, the pain subsides, even although the local source of irritation remains; still, as long as it remains, toothach recurs whenever local or constitutional causes of neuralgia occur to develope its effects.

23. The attacks of toothach vary much in character and intensity, according to the nature of the local mischief, to the states of the digestive organs, and the temperament and diathesis of the patient. In some the paroxysm is most acute and intense, but of short duration; in others it is much less severe, but continues a much longer and a very indefinite time, it being of an aching kind with occasional exacerbations. In many, the pain, whether most acute or more chronic, is limited to the seat of local mischief, or even to the tooth itself; in others the pain extends to the whole jaw, or to the cheek, or even to the whole side of the face, particularly when the upper jaw is the seat of irritation, and after exposure to a current of air or to cold. In those states of the complaint which have, by some writers, been called *catarrhal*, *rheumatic*, and *gouty*, the pain often extends to a great part of the same side of the face, and it is often difficult to localise it, with much precision.

24. iii. NEURALGIA OF THE NECK AND TRUNK. — *A.* M. ITARD has described, under the name of *Otalgia*, a neuralgia of the ear, seated chiefly, as he supposes, in the *chorda tympani* and acoustic nerve. It is sometimes associated with neuralgia of the face. The pain in the ear is very acute, is sudden in its accession and disappearance, and is independent of any indication of inflammation of the ear. It is often attended by noises in the ear, and by temporary deafness (*see art.* EAR, § 6.).

25. *B. Neuralgia of the cervical Nerves* is very rare. M. BOSQUILLON met with a case which was apparently caused by the puncture of a nerve in bleeding from the jugular vein; and M. JOLLY has alluded to another which appeared to be produced by the application of leeches to the side of the neck. A less severe or *chronic form* of neuralgia of certain of these nerves, resembling rheumatism in many respects, but attended by spasm or contractions, more or less permanent, of some of the muscles, sometimes occurs in connection with caries or other disease of, or in the vicinity of, the upper cervical vertebræ. Of this state of the complaint I have seen two or three cases, but in neither was the pain so intolerable as in the most acute cases of neuralgia.

26. *C. Neuralgia of the thoracic or intercostal Nerves*, and painful affections of the other nerves of the trunk, have been described by SIEBOLD, NICOD, JOLLY, ALLNATT, VALLEIX, TEALE, and BROWN, as *Neuralgic*; by PARRISH, DARWALL, GRIFFIN, OLLIVIER, and BENNETT, as resulting from *spinal irritation*; and by TATE, ADDISON, and others in connection with *hysteria*, and *uterine irritation*. That these painful affections, whether amounting to neuralgic acuteness, or hardly exceeding a rheumatic aching, may depend, in some instances, upon vascular congestion of a portion of the spinal cord, or of its investing membranes, or upon inflammatory irritation, or some other morbid state of the circulation in these parts is very probable, although the exact state of these structures has not been satisfactorily demonstrated in connection with these affections. Still cases not infrequently occur of neuralgic or painful states of the thoracic and abdominal nerves, without any evidence of congestion or irritation of the spinal cord; whilst, on the other hand, proofs of these states of spinal disorder are often furnished to the close observer, without any painful expression of it in those particular nerves. When treating of the painful manifestations of HYSTERIA (*see that art.* §§ 14, *et seq.*), I had occasion to remark, that disease of the spinal cord or of its membranes is not necessary to the production of these painful affections; and that when such disease is observed in connection with them, it is to be viewed rather as a contingent result of the same irritation as produced them, or as an associated complaint, rather than as the primary and necessary source of these affections (HYSTERIA, §§ 23. 61.). A similar view may be entertained respecting the connection of neuralgia of the nerves of the trunk with spinal irritation, in cases where no evidence of hysteria exists.

27. That neuralgia of these nerves is often connected with hysteria, as often with evidences of disorder, congestion, &c. in a corresponding portion of the spine, and often also without one or other of these, and even without both, I believe to be nearly the truth. The much greater frequency of the affection in females tends to prove the first of these positions. Thoracic neuralgia commonly occurs about the union of the seventh, eighth, and ninth ribs, with their cartilages, and chiefly on the left side. The pain often extends from this point, in the course of the nerve to the spine, and sometimes it associates itself with a similar

pain in the mamma of the same side. It generally darts in the course of the nerve; and, although it has little influence on the state of the organic functions, it sometimes embarrasses the respiration. It is occasionally associated with pain in the epigastrium or in the bowels, or with hysterical colic, or with pain in the region of the uterus or ovaria. These neuralgic pains may be distinguished from rheumatism by the latter being accompanied with soreness of the muscles on pressure, and on contracting them; whilst the former are attended by extreme sensibility of the skin and parts supplied by the affected nerve. These pains sometimes occur coëtaneously on both sides of the chest, rarely successively, and often they are periodic. They are frequently independent of any evidence of disorder in the spinal cord or its coverings.

28. Intercostal neuralgia is a frequent complaint. The greater number of cases usually denominated *pleurodynia*, ought to be classed under this head. It chiefly affects females: of 148 cases noticed by Messrs. GRIFFIN, 26 were males, 49 married women, and 73 girls. It is most frequently observed between the ages of 15 and 50 years; and occurs in all temperaments, particularly in the nervous and sanguineo-nervous. Residence in low, damp cellars and localities, or in close ill-ventilated apartments; laborious vocations, and poor diet; watchings and night work; are amongst its most influential causes. It is sometimes associated with other neuralgic affections, or with suppression or irregularity of the catamenia.

29. This affection occurs much more frequently in the left than the right side. According to the researches of M. VALLEIX, of all the intercostal spaces, the sixth, seventh, eighth, and ninth are its common seats. He has never observed it in the eleventh and twelfth spaces, and very rarely in the first and tenth. The pain is generally much increased on pressure; but not in all parts of the course of the nerve. There are usually very limited points where the pain is felt acutely; and these are separated by intervals, where pressure is not painful. These points are situated, 1st. A little from the spinous processes, and corresponding to the point where the nerve passes from between the vertebræ. 2d. At the anterior part of the intercostal space, and near to the sternum or epigastrium; and 3d. About the middle of the intercostal space; where, however, the pain is much less frequent than at either extremity. At these points, the pain is often so acute as to occasion the most marked indication of extreme suffering when the finger is passed over them; and it is generally increased on a full inspiration, by cough, and sometimes even by the movements of the arm or side; but it presents this peculiarity, that inspiration excites pain in one point, and other emotions in a different point.

30. The pain may be either dull, aching, sore and continued, and felt chiefly in one or other of the points just specified: or it may be sharp, darting, poignant, and recurring at intervals of short, but of various duration. Generally both kinds of pain are felt, the latter being superadded to the former. The acute lancinating pains commonly proceed from either of the points which are painful on pressure, and dart in the course of the nerve. In connection with this pain, there is no indication, upon auscultation or percussion, of inflammation of either the lungs, pleura, or pericardium; and there are also febrile symptoms. The digestive organs are, however, commonly more or less disordered, this disorder manifestly depending upon the same pathological state as gives rise to the neuralgia, viz. impaired energy and irritation of some portion of the organic nerves.

31. The course of this affection is often irregular. The pain usually increases gradually, and subsides in the same way; but it is much influenced by the states and vicissitudes of season, weather, and temperature. It is commonly most severe in cold or snowy weather. In many the affection assumes a regularly intermittent form, and it is then of long duration.

32. *d. Neuralgia of the lumbar Nerves* has been mentioned by several writers, but true neuralgia is rarely observed in this situation. Most of the cases which have been thus termed have evidently been instances of severe pain, symptomatic of irritation in the kidneys, ureters or urinary bladder, or in the uterine organs. MM. CHAUSSIER, RICHERAND and DELPECH, have described cases of neuralgia, which they have referred to the anterior branch of the first lumbar nerve, and in which the pain has extended from the loins and crest of the ilium to the groin and labia of the vulvæ of the female, and to the chord and scrotum or testicle. The pain was very acute, and recurred daily, with retraction of the testicle, but without any disorder of the urinary excretion. Somewhat similar cases have been noticed by MM. BARRAS and CAMPAIGNAC; but in these the pain, affecting chiefly females, was experienced near the neck of the bladder and vulva, and was unattended by any disorder of the urinary functions. SIR ASTLEY COOPER has adduced some cases, in his work on the Testis (p. 110.), which he believed "to be seated in the nerves and to be of the nature of tic douloureux." In these, the pain darted in the direction of the spermatic chord; and one of them seemed to have been caused by an injury received some time previously on this part. Sir ASTLEY states that the affected testis hung lower than the unaffected, and he adds that he dissected all the testicles which he had removed for this complaint, but there was no apparent structural change in any of them.

33. Certain states of *lumbago* are more nearly allied to neuralgia than to rheumatism, in respect not only of the characters of the pain and of the accompanying, but also of the aggravating and alleviating circumstances and agents. Even in those cases, where the pain is evidently seated in the lumbar muscles, it is nevertheless to be referred to some change in the circulation in that portion of the spinal chord, or in the roots of the nerves supplying these muscles. (*See arts.* RHEUMATISM, and SPINAL CHORD.)

34. iv. NEURALGIA OF THE EXTREMITIES. — *Neuralgia Membrorum.* — *Neuralgie des Membres*, Fr. — Neuralgia is comparatively rare in the upper, but not infrequent in the lower extremities. — *A. In the former situation*, cubito-digital neuralgia, as it has been termed by CHAUSSIER, or neuralgia of the cubital nerve, is oftenest met with. It is generally seated in that portion of the nerve which passes between the internal tuberosity of the humerus and the olecranon, from which it

darts in the course of the nerve. Sometimes it appears below the armpit, following the inner margin of the fore-arm, and extending to the cutaneous branches of this nerve, and to those sent to the little and ring-finger. In recent attacks the temperature of the arm is occasionally increased during the paroxysm, which frequently occurs during the night. In very severe fits the patient experiences much anxiety, often holds the arm up, and grasps it forcibly with the other hand. Besides neuralgia of this nerve, M. Martinet has mentioned neuralgia of the *supra-scapular* and *external musculo-cutaneous nerves.* In both these the pain is seated in, and extends more or less to, the ramifications of the nerve. In these three different seats of suffering the complaint presents similar phenomena.

35. *B.* Sciatic Neuralgia.— *Neuralgia Sciatica.* — *N. fémoro-poplitée*, Chaussier; — *Sciatica*, Auct. Var.; — *Ischias nervosa postica*, Cotugno; — *Ischias, Sciatica, dolor ischiaticus, Ischiagra, Malum ischiadicum, &c.* — This form of neuralgia was formerly confounded with all painful affections of the hip and adjoining parts,—whether inflammatory or rheumatic — primary or symptomatic; and the pain was referred to the joint, to the muscles, to the bones, to the tendons, to the nerves, &c., according to the views of the writers. Hence amongst the *synonymes* of the complaint we find *Morbus Coxendicus, Morbus Coxarius, Dolor Coxæ, Coxagra, &c.*, names which belong to different affections. Sciatica has also been viewed as a variety of rheumatism, until the comparatively recent writings of Chaussier and others have shown that, although often very closely allied to certain states of that disease, it is essentially a form of neuralgia. It is a common disease in advanced age; it is very rare in infancy and childhood; and it is somewhat more frequent in females than in males, particularly in females during the puerperal states. It attacks in preference the nervous temperament, and the rheumatic and gouty diathesis. It is most frequent in cold and wet seasons, during stormy and changeable weather, and in low, humid, clayey, and marshy localities. It is common among fishermen, sailors, soldiers, and all those who are liable to wear wet clothes, or who are exposed to currents of damp air or to cold. Owing to the state of weather, season, locality, and occupation, I have observed it assume an almost epidemic frequency.

36. An attack of sciatica generally commences with acute pain in the sciatic slope or curve between the great trochanter and the ischium; and the pain follows the course of the great sciatic, or femoro-popliteal nerve, extending sometimes upwards to the sacrum, but generally downwards along the posterior surface of the thigh to the popliteal space, and often along the nerves of the leg to the foot. It is sometimes very severe in the tibial nerve. The accession of pain is occasionally sudden, but it is often preceded by painful pricking or tingling along the thigh, by slight numbness, or by chills, formication, &c. Usually one limb only is affected, and very rarely both. The motions of the extremity are extremely painful and difficult. During the exacerbations some patients suffer most in the sciatic slope, others in the posterior part of the thigh, and others in one or both the popliteal or tibial nerves. The pain is in every respect similar to that felt in other kinds of neuralgia. Exacerbations of it occur generally in the evening or during the night, and cease in the morning; but several may take place during the day, with remissions more or less complete, during which the pain is more dull, and is attended by numbness and pricking or tingling. The slightest cause may bring on the exacerbations, as motion or exertion, the heat of bed, or mental excitement. The duration of the *exacerbations* of pain, as well as the frequency of their recurrence, is very various, and differs but little from other forms of neuralgia. The continuance of the *attack* is equally uncertain; the causes of the complaint, the constitution of the patient, and various other circumstances, influencing it. In some cases, the accessions of suffering are followed by convulsive or trembling movements of the limb, by slight numbness, or partial palsy: and an attack generally leaves the limb emaciated, flabby, and weakened. When the attack has been very severe, or of long continuance, lameness, a dragging of the leg; great emaciation of the limb; a weakened or partially paralysed state of the muscles; and disorder of the digestive organs, are experienced for some time afterwards.

37. *C.* Femoral or Crural Neuralgia — *Neuralgia Cruralis* — *Ischias nervosa antica*, Cotugno — *Neuralgie fémoro-pretibial*, Chaussier — occurs much less frequently than sciatic neuralgia. It may affect any portion of this nerve from the groin downwards. It often commences in, or a little below, the groin, and extends along the anterior and internal aspect of the thigh and leg to the foot, and even to the sole. In a case of neuralgia seated in this nerve, in a gentleman from South America, at present under my care, the pain is experienced chiefly in the middle of the thigh and of the leg, and *in both extremities.* The pulse is somewhat frequent and irritable, and the bowels disposed to be costive. The muscles are soft and flabby, and the spirits depressed.. The complaint has been of long duration, and the intermissions few and of short duration, since his arrival in England.

38. v. Neuralgia of Muscular and Membranous Structures has been noticed by several modern writers; and, adhering to the definition of neuralgia (§ 1.), and to the circumstance of the occurrence of severe pain in these structures independently of fever, it may be viewed as often allied to neuralgia, although passing, in its characters and in its various morbid associations, in some cases into chronic rheumatism or gout, and in others into hysteria.—*a.* But in *true neuralgia of the muscles* the pain is much more acute than in rheumatism, recurs in frequent exacerbations, and is rarely or never altogether absent in a dull or numb form. In all the cases I have seen, the remissions were attended by weakness or partial palsy of the muscles affected; and the complaint was symptomatic of organic lesion in either the brain or spinal chord; apoplectic, epileptic, or paralytic attacks generally occurring after longer or shorter periods. A lady from Gravesend consulted me a few years since for neuralgic pain of the muscles of one side, and particularly of those of the shoulder and arm of that side. After many months of suffering, maniacal delirium and palsy supervened. Several large tubercular formations were found in the brain after death, similar

to those described in the article BRAIN (§ 111.). Indeed, as Dr. SEYMOUR has very justly insisted, those severe neuralgic pains in the muscles or limbs should always lead to suspicion of the existence of softening or other organic lesions or formations in the substance of the brain. In two cases, when the muscular pains were most acute in the thighs, and were attended by occasional cramps, and were followed by weak and irregular action of them on volition, amounting to partial paralysis, extensive organic change was found in the spinal chord and its membranes. (See SPINE and SPINAL CHORD.)

39. *b.* The painful affections of the *periosteum*, attributed to syphilis or to mercury, as Dr. T. THOMSON has suggested, are in many respects neuralgic. The painful affections noticed so fully in the article HYSTERIA (§ 14. *et seq.*) differ from neuralgia chiefly in the seat of irritation causing them — in the affection of the uterine organs. A neuralgic affection of the *skin* has been noticed by some writers, and its connection with herpes and other cutaneous eruptions pointed out. In some states of hysteria the sensibility of the skin is often most painfully increased. The epidemic fever that prevailed in Paris in 1828, and in some of the West India Isles, was attended by pricking and severe pains in the skin and upper and lower extremities, alternating with numbness. But these symptoms were accompanied with so many others, which often predominated, that they cannot be viewed as constituting a form of neuralgia, although illustrating certain manifestations and morbid associations of this affection.

40. vi. VISCERAL NEURALGIA. — It is unnecessary to notice, otherwise than by enumerating the several visceral affections which, if not truly neuralgic, are in many respects related to neuralgia. Most of these have been duly considered in the several articles or sections of articles devoted to them.—*a.* Certain forms of *headach*, particularly the nervous forms, and those which are limited to one part, or which are attended by violent shooting pains, or are remittent or intermittent, are closely allied to neuralgia, and are generally aggravated and alleviated by the same agents and influences as it. In these cases, the pain is to be referred to the state of some portion of the ganglial nerves supplying the brain, in connection with some change in the state of the cerebral circulation. Indeed, visceral neuralgia, with few exceptions, which will be noticed, may be referred to the ganglial nerves, or may be termed *ganglial neuralgia* — a seat of those complaints pointed out by me as early as 1821 and 1822 in the works noticed in the *references* to this article.

41. *b. Ganglial neuralgia* most frequently occurs in delicate constitutions, and in nervous, melancholic, or lymphatic temperaments. It is more frequent in females than in males, and is caused by all the moral and physical influences which powerfully impress the nervous system. As in *external*, so in *visceral* neuralgia, the course of the affection is intermittent or remittent; but the recurrence of the attacks are less regular in the latter than in the former. And in the visceral as well as the external complaint it may be presumed that more or less of vascular determination or fluxion follows the excessive exaltation of sensibility, at least in some cases. Visceral or ganglial neuralgia may thus be followed by increased secretion, or by other evidences of increased vascular reaction or determination. It is also apt to perpetuate itself, or is more prone to return or to continue after having once appeared; and it seldom leaves after it, or presents upon the examination of fatal cases, lesions sufficient to account for the amount of suffering experienced during life.

42. *c.* The chief *special forms* of visceral neuralgia which present themselves in practice are — 1st. *Neuralgia of the heart*, and particularly that form of it which has been termed *angina pectoris;* — 2d. *Gastrodynia* or *gastralgia*, and its various morbid associations; — 3d. *Colic* and *ileus*, more especially lead colic; — 4th. *Hepatalgia* and *splenalgia*; — 5th. *Nephralgia*; — 6th. *Hysteralgia*; — and 7th. *Mastodynia.* These are all fully noticed either in the articles devoted to them especially, or in sections of the articles on the diseases of the organs in which they are seated; and their pathology is still further illustrated in the article on IRRITATION and its sympathetic relations. The subject of *nephralgia* (see KIDNEYS, § 249.) is well exemplified in the case of intermittent neuralgia of the kidneys described by Dr. MACCULLOCH, in which the secretion of urine was greatly increased. In some slighter states of this affection, occurring in hysterical females, and generally associated with more or less of hysteria, this influence of morbidly exalted sensibility of the nerves of the organ upon secretion, is also fully shown.

43. *d.* Many of the cases of *Hysteralgia*, or *irritable uterus*, as it has been most commonly termed in this country, may be considered as neuralgia of the uterus, although it is ascribed by some writers to congestion of this organ. Doubtless cases sometimes occur of severe pain in the uterus, depending upon, or at least associated with, congestion or chronic inflammation of the neck and mouth of the womb; but there are others of a more truly neuralgic character, which may be discriminated from these by a due exercise of tact and observation (see art. UTERUS, *Painful affection of*,), and which are most successfully treated, according to the principles of cure recommended for neuralgia.

44. *e.* Neuralgia of the *vagina* has been noticed by a few writers. It has been variously described by patients as a most acute burning, or lancinating, or lacerating, or plunging pain. It is usually of short duration, and of frequent recurrence; but it is sometimes attended by a more continued aching or soreness; and the attacks are after intervals of various and sometimes of very long duration. In its idiopathic form there is no appreciable lesion of the vulva, vagina, or uterus, but it is occasionally symptomatic of organic lesion of the womb, and the patient is usually fearful of cancerous or other serious mischief being present. It has been imputed to cold or astringent injections for the cure of leucorrhœa, to sitting on cold or damp seats, and sitting on stones or on the ground; to excesses in coition, and to other causes of neuralgia; but certain of these are matters rather of inference than of ascertained occurrence.

45. vii. NEURALGIA OF NERVES OF ASSOCIATION. —*a.* It is extremely probable that several anomalous painful affections, occurring in paroxysms of extreme agony, which cannot be referred with pre-

cision to a single part or organ, but which affect the *diaphragm*, *stomach*, *heart*, and their vicinity, or either of them more or less prominently, are actually instances of neuralgia of these nerves, and the ramifications of them, particularly of the *pneumogastric* and *phrenic nerves*. Several of these affections have been considered as instances of angina pectoris; but although nearly allied to that affection they are more correctly instances of neuralgia of these nerves, the phenomena characterising individual cases varying with the ramifications especially affected, and with the associated affection of ganglial nerves frequently accompanying them. Many of the cases of these neuralgic affections occur in persons who have experienced either regular or irregular attacks of gout, and have hence been viewed as occurrences of retrocedent or misplaced gout, both from this circumstance and from the immediate relief consequent upon the development of that disease in the extremities. Still some of these cases occur either without any previous manifestation of gout, or without any attempts subsequent to their appearance to develop the gouty attack. In a case long attended by Dr. ROOTS and myself, in which the attacks of extreme agony were referable to the diaphragm, heart, and stomach, but sometimes to one of those situations more than to the others, there has been no regular manifestation of gout; and in another occasionally seen by me for twelve or thirteen years, there has been no attempt to develop a paroxysm of that disease since the first occurrence of the visceral neuralgia, although treatment was often prescribed with this intention. In this case the violent attacks of pain in the præcordia, and sometimes also in the stomach, with marked disorder of the heart's action, were often alternated with the most acute pain of the head, generally of some hours' duration, or even longer. Notwithstanding the extreme suffering these two patients have endured for many years — in one case about 10 or 12, in the other for 14 or 15—the general health has not suffered, and no further change beyond that depending upon advancing age can be observed.

46. *b*. Many of the more severe sufferings often complained of by *hypochondriacal* and *hysterical patients*, and which are very generally viewed as either imagined or remarkably exaggerated, owing to the general health being but little impaired, and to the little disturbance evinced by the organs of circulation and locomotion, may be considered as forms of neuralgia affecting chiefly the nerves of organic life or of association. In many cases of *hypochondriasis* and *hysteria*, the most distressing pains are referred to the stomach or to the bowels, to the heart, and to various other viscera; and in some these pains are said either to change their seats from time to time, or to affect several organs, or even to assume different features. The circumstance of these sufferings engaging the entire attention of the patient, and the apprehensions and despondency often attending them, being usually viewed in connection with very slight appearance and evidences of ailment, often lead to a belief in their want of reality; whilst they should be viewed as evidence of greatly impaired energy of the ganglial system of nerves, or even of more serious disorder of these nerves,—of asthenia of this part of the nervous system, associated with a morbid exaltation of its sensibility, and not infrequently with either functional or structural lesion of one or more important organs, particularly of the organs subservient to the perpetuation of organic life. I have had already frequent occasion to remark upon the efforts made by nosologists and systematic writers to point out differences, and to manufacture genera and species as if they were dealing with the distinct objects of natural history, whilst they ought at the same time that they mark differences and modifications of morbid action, to show obvious connections and intimate alliances — such as are so frequently exhibited by hypochondriasis, hysteria, and neuralgia — and more especially visceral neuralgia.

47. III. DIAGNOSIS OF NEURALGIA. — A fully developed case of neuralgia is characterised by the remarkable severity and frequent recurrence of darting or plunging pains, and by the intermittent or remittent forms of the attack. The situation of the pain in the course of a nerve serves to indicate the nature of it, in the less violent cases, whilst the ease caused by pressure, and the absence of fever, of tenderness on firm pressure, of hardness or swelling, and of heat in the seat of the nerve, distinguish these cases from neuritis. This distinction, however, does not always hold, for I shall hereafter have to show that some cases of neuralgia depend upon a congested or slightly inflamed state of the origin or some portion of the nerve. In all cases both of internal and external neuralgia, the effect produced by firm and continued pressure aids the diagnosis; for where pressure gives ease or is well borne the neuralgic character is thereby indicated; and where the neuralgia is associated with congestion or inflammatory action, pressure will indicate their existence.

48. *a*. When the *nerves of the face* are affected in the extreme manner characteristic of tic, the disorder cannot be mistaken for any other. Even when it is attended by spasm or twitchings, &c. of the muscles of the face, it cannot, owing to the seat and violence of the suffering, be confounded with *trismus*; and in even the less severe cases, the recurring nature of the pain sufficiently marks it from the continued pain, increased on the action of the muscles, constituting *rheumatism* of the face, which also is sometimes attended by swelling.

49. *b*. In neuralgia of the *nerves of the trunk* the chief object of the diagnosis is to determine the existence or non-existence of inflammatory action or congestion in the spinal chord, or in its membranes. This can be ascertained only by attention to the history of the case, and by a careful examination of the spine. It is of importance also to ascertain whether or not the pain is dependant upon disease of a viscus near or related to the nerves affected, or to the seat of pain; and this object is to be attained only by careful examination, and by the aids of percussion and auscultation, with due attention to the constitutional and symptomatic phenomena.

50. *c*. The same intentions as the above should guide our inquiries in forming a diagnosis of *visceral neuralgia* from inflammation or congestion, or even from organic disease of the viscera, to which the patient's sufferings are referred: and in these, as well as in others, the continued and persistent character of the pain and other symptoms, tenderness on pressure, heat, swelling, or

distension, febrile commotion, the state of the pulse, of the secretions and excretions, and of the tongue, countenance, and skin, will indicate the presence of inflammation, or of active vascular determination; and in plethoric patients, of congestion; and will point out the treatment which should be adopted, whilst the intermittent, remittent, or periodic pain, the marked intervals of ease, the history of the case, and the circumstances increasing or ameliorating the patient's sufferings, will demonstrate the neuralgic character.

51. *d. Neuralgia of the extremities* can hardly be confounded with any other disease, unless when the ischiatic nerve is affected. *Sciatica* may be mistaken for disease of the *hip-joint*, or of the vertebræ in connection with inflammation or abscess of the *psoæ muscles*, extending to adjoining parts; or these affections may be mistaken for sciatica, the ischiatic nerve, or the nerves contributing to form it, being often inflamed or irritated, or pressed upon, in the course of these maladies. In *psoas abscess*, the pain in the loins, the tenderness in that situation and anteriorly, the acute hectic fever, the continued form of the disease, the obvious tumour and the consequent fluctuation, the direction which the tumour takes either to the groin or to the loins near the sacro-iliac juncture, &c., suffice to distinguish it from true sciatica. In *hip-disease*, or even in spontaneous dislocation of the hip, the situation of the pain, the alteration in the direction and position of the trochanter, and the lengthening and subsequent shortening of the limb, show the nature of the disease.

52. IV. — CAUSES. — *A. Predisposing.* — *Neuralgia* is most frequently observed in the nervous and melancholic temperaments; in persons of a hypochondriacal, hysterical, rheumatic, and gouty diathesis; and in adult and aged subjects. Sex has no very marked influence upon its frequency, although certain of its forms are more frequent in females than in males, whilst other forms are more common in males. It is oftener met with in females about and after the cessation of the menses, than at any other period; and it is more common in the wealthy or easy classes of society than in the poor and laborious. It is more common in cold and humid, than in warm and dry climates. Chronic or prolonged debility, the exhaustion consequent upon acute diseases, and prolonged or neglected dyspepsia; the puerperal states, exhausting discharges, and prolonged or improper lactation; excessive venereal indulgences, menstruation, &c., anxiety of mind, &c., are among the most influential predisposing causes.

53. *B. The exciting causes* are not always clearly ascertained in practice, for whilst some cases are chiefly referable to physical causes acting either upon the *brain* or upon the *nerves*, others can be attributed only to some pre-existing disorder, or pathological condition, which, however, when more closely viewed, often appears as much an associated effect of some anterior morbid state as an efficient cause of this affection. — *a.* There can be no doubt that moral emotions of a powerful kind, prolonged mental excitement or anxiety, habitual exertions of the intellect, prolonged watchings, and other circumstances which affect nervous power and the state of the cerebral circulation, particularly when aided by other exciting causes, will be more or less influential in producing certain of the varieties of neuralgia, more particularly those seated in the nerves of the head or face. BELLINGIERI met with two cases of tic which were caused by fright.

54. *b.* Of all the causes whose operation is well ascertained, there are none more efficient in producing these complaints, particularly when seated in the extremities than exposure to *malaria* and to *damp* and *cold* in any form, — to any of them singly, and more especially when they are conjoined. One of the most important services rendered to medical science in modern times, is to be found in the exposition of the causes and morbid relations of neuralgic affections by Dr. MACCULLOCH. Until that work appeared the influences of malaria in causing the several forms of neuralgia, especially when aided by damp and cold states of the atmosphere, were hardly acknowledged, and the important connections of neuralgic affections with other diseases were entirely overlooked. But, even without any probable operation of malaria, cold and damp, particularly when the exposure to them has been prolonged or frequent; vicissitudes of season and weather — especially in respect of humidity and electrical conditions; the partial abstraction of animal heat by currents of air, by wet clothes or shoes, or by sitting on cold or damp seats, standing or sitting on cold floors, and exposure of the face to cold and wet, or to a snow-storm, especially when outside a carriage, have no mean influence in producing neuralgic complaints. Residing in low and damp cellars or houses; sleeping on the ground or on the ground-floor, or in the open air; low, damp, and miasmatous localities and a clayey soil, are often so productive of these complaints as to impart to them an *endemic* character; and when to these are superadded wet and cold seasons, the prevalence of rains and stormy weather, and electrical vicissitudes of the atmosphere, they may even assume an *epidemic* appearance.

55. Of the influence of local injury, — of foreign substances lodged near to or between the fibriles of a nerve, — of bruises, wounds, &c., — of over-stretching a nerve by great efforts, — and of undue or prolonged pressure of a nerve, in the production of both neuralgia and chronic inflammation, notice has been taken in the article NERVES (§ 20.). These produce or perpetuate irritation and inflammatory action or congestion in the portion of nerve thus injured. Indeed some of the pathological causes about to be noticed have a similar effect.

56. *c. The pathological causes and associations of neuralgia* are of much importance as respects the obvious indications of cure which they suggest. Certain of these causes act directly upon the nerves affected, and some even upon the part which is the source and centre of pain, whilst others exert a more distant or sympathetic, and not infrequently a doubtful influence. The same causes as were stated to occasion inflammation of a nerve (§ 33.) may produce neuralgia, and any of the organic lesions of nerves (§ 2. *et seq.* 24. 26.) may have a similar effect. Various structural changes seated at the origin of a nerve, or in the nerve itself, or in contact with it, or so near it as indirectly to implicate it, may occasion either pain or spasm, or both, or palsy, according to the manner in which they either irritate the fibriles devoted to sensation or to motion, or entirely interrupt one or both of these functions. Hence the intimate con-

nection existing between *neuralgic, spasmodic*, or *convulsive*, and *paralytic maladies*.

57. The pathological causes which occasionally give rise to neuralgic affections in some one or other of their seats are very numerous, and may be divided into,— 1st. those which are *hyperæmial*, or consist of congestion or inflammation in some portion of the nerve, or in its origin;— 2d. those which are *anæmial*, or which consist of a deficiency of blood; — 3d. those *which occasion irritation* in some portion of the trunk or of the ramifications of a nerve, or even of or near to its origin; — and 4th. those which consist of irritation or other similar disorder of remote but related organs or parts. Several of the pathological conditions comprised under these four categories are probably, on some occasions, mere accidental morbid associations resulting from pre-existing disorder; but they are, with equal probability, in other cases, the active agents of the neuralgic affection. Others of them are concurring or aiding influences in developing the effects of more energetic causes.

58. (*a.*) *Hyperæmia* in any form, general or local, congestive or inflammatory, may either at the origin, or in the course, of a nerve, occasion this affection. Evidence of this is to be found in the appearances observed in some cases after death; in the termination of several in apoplexy or palsy; and in the symptoms and the effects of treatment in other cases. I was consulted several years ago by a gentleman about fifty years of age suffering neuralgia of the head and face: the symptoms indicated active determination of blood to the brain, and he was treated accordingly, and the neuralgia disappeared. Two years afterwards he experienced a return of the affection; and he had just arrived in the vicinity of London from the country to consult me, when he was seized with apoplexy and soon afterwards died. I was called to a lady about fifty years of age, suffering neuralgia referred to inflammatory congestion or similar change within the cranium. Cupping in the nape of the neck, with other means appropriate to these views, were prescribed. She was relieved; but the complaint soon afterwards returned. Her friends then requested a consulting surgeon to see her; and he prescribed large doses of the carbonate of iron. She immediately became maniacally delirious, afterwards hemiplegic, and she soon afterwards died. The family surgeon informed me that the appearances after death indicated intense vascular congestion, with signs of previous inflammation. A gentleman from the country very recently came under my care for chronic diarrhœa of seven years' continuance. He had experienced two attacks of phlebitis of the femoral veins consequent upon having taken the extract of logwood; this medicine having restrained, but not arrested, the diarrhœa. A cautious alterative and derivative treatment was therefore prescribed, and the diarrhœa was slightly abated and the stools improved. But a violent attack of neuralgia supervened,—the pain being seated chiefly in the *right side* of the occiput, and in the frontal branch of the fifth pair of nerves of the *left side*. The increased action of the carotids induced me to prescribe local blood-letting, a blister to the nape of the neck, a blister on the abdomen, &c., and the attack entirely ceased in a short time. But a few days afterwards the phlebitis returned for the third time, but in a less severe form, recovery from it taking place after some days, but the diarrhœa was only moderated.

59. That cerebro-spinal neuralgia is sometimes owing to *venous congestion* or *inflammatory action* in a limited portion *of the spinal chord or its membranes*, or even of the theca vertebralis and the vicinity of the inter-vertebral foramina, cannot be doubted, inasmuch as it is sometimes observed in connection with, and manifestly depending upon, these lesions. In two cases, both of them males between fifty and sixty years of age, the neuralgic pains, sometimes associated with spasm of the abdominal and femoral nerves and muscles, of which they complained for several years, and which ultimately terminated in paraplegia, were ascertained by post-mortem examinations to have arisen from these changes. These cases were frequently seen by the author and other physicians, and the nature of the malady recognised from the first. It is not unusual to observe, associated either with these affections of the spinal chord and its membranes, to which the term spinal irritation has been recently applied, or with inflammation of the constituent structures of the spine, or with caries of the vertebræ, intense neuralgia, or marked pain, generally of a remittent or intermittent kind, in one or more of the spinal nerves, more immediately related to the seat of these lesions. When the vertebræ and their connecting structures are unaffected in these cases, the disease in the spinal chord and its membranes may not be evinced by tenderness on pressing the spinal processes, or by manual examination of the spine, especially in adult or aged males.

60. It is almost unnecessary to add, that inflammation of the nerve itself, a congested or varicose state of the vessels supplying the cellular tissue forming the sheath or connecting the fibriles of the nerves, and the usual consequences of inflammatory action, as the effusion of lymph, or of puriform matter, either in the connecting cellular tissue or around the nerve, &c., will sometimes give rise to neuralgia, or to pain similar to neuralgia, particularly when the larger nerves of the lower extremities are the seat of these changes. This cause, first contended for by Cotugno, has been fully confirmed by Cerillo, Bichat, Siebold, Swan, and others. However, it must be admitted, as will be shown more fully hereafter, that inflammatory changes in the neuralgic nerve are observed only in a small proportion of cases of this complaint; and in most even of these the attendant pain is more permanent, the intervals of ease shorter and less complete, than in those cases of neuralgia where these changes are not discovered.

61. (*b.*) *Anæmia* is much less frequently a cause than a complication of neuralgia; and its influence is more predisposing than exciting. The same remark equally applies to plethora. But it is not unlikely that great deficiency of blood may so affect a portion of the cerebro-spinal axis as to occasion acute pain in some one of its nervous ramifications. But whether a cause or a complication, it is not unusual to meet with evidence of anæmia in some instances, or of general plethora in others, in connection with neuralgic affections. In hysterical females, or in those subject to menorrhagia, more or less deficiency of

blood is sometimes associated with these affections, particularly with visceral neuralgia.

62. (*c.*) The dependence of neuralgia upon *irritation* of a portion of the trunk or ramifications of the affected nerve may be admitted as having been proved in some instances. Sir H. HALFORD, in his *Classical Essays*, has adduced several instances of the dependence of the complaint upon a preternatural deposit of bone, or upon diseased bone. Amongst the most frequent of the former are exostosis in some part or throughout the frontal sinuses; thickening or bony deposits in this situation, or in the ethmoidal and spheroidal bones; ossific deposits in the falciform process or other parts of the dura mater; and exostosis from a fang of a tooth. Thickening or exostosis of the frontal bone, or ossific deposits in the dura mater, may occasion the complaint by affecting the extreme ramifications of the nerve affected, or of some other nerve intimately related to it; but in these cases the connection between the presumed cause and the disorder is not so obvious as in some cases of exostosis or other disease of the fangs of a tooth, or caries, exfoliation, or of the alveolar processes, or disease of the jaw, antrum, &c. Various kinds of tumours have been found in the close vicinity of the trunks as well as the terminations of neuralgic nerves; and ossific deposits in the adjoining vessels, membranes, &c., have likewise been found. That the former may affect the sentient functions of a nerve is very probable; and that the latter may be a consequence as much as a cause of neuralgia, in some instances, is also likely. We cannot with logical precision assign all or even the majority of lesions found after death as the immediate causes of suffering. Some of them are effects of that suffering, and others are either associated results, or merely coincidences, in the varied course it has taken, or effects merely of the intercurrent disorders by which that course has been modified.

63. The irritation or similar affection of the cutaneous extremities of the affected nerve, either by chronic eruptions, as herpes zoster, &c., by superficial injuries, punctures, leech-bites, and cicatrices, has individually occasioned neuralgia. In these cases, as well as those caused by diseased teeth, caries, and exfoliations of bone, &c., the connection of cause and effect has been fully proved by the disappearance of the effect upon the removal of the cause. Thus the removal of diseased bone or teeth has often cured the neuralgic complaint; and suitable applications to a cicatrix, to which a cure of neuralgia was attributed, removed the pain (BRIGHT). In many of the cases which evidently depend upon irritation in these precise situations, the affection may be seated at a considerable distance from its local cause, or it may commence in the very seat of irritation, and suddenly dart to a remote part. Thus, as in the cases adduced by Mr. BELL and M. PIORRY, the pain may commence in a tooth, and suddenly pass to the arm, or even to the neck and trunk; and upon the removal of the tooth all disorder may cease.

64. (*d.*) The cause of neuralgia may consist of *irritation of an organ or part at a distance from, but more or less related to, the seat of suffering.* In several articles in this work, and more fully, and with reference to other articles, in that on IRRITATION, I have shown that disorders of various internal organs or parts may so affect not only other distant *internal* organs, but also remote *external* parts, or those supplied by cerebro-spinal nerves, so as to occasion convulsions, spasms, and morbid exaltations of sensibility. It has been supposed by many that *disorders of the digestive organs* may give rise to neuralgic affections in various situations, and I believe that such disorders — whether consisting of irritation caused by hurtful ingesta, or by the accumulation of acrid or otherwise vitiated secretions, may have this effect, not only in these organs themselves, as in gastralgia or gastrodynia, enteralgia or colic, but also in remote but related organs, as the heart, diaphragm, &c.; and even in one or more of the nerves proceeding from the cerebro-spinal axis. The disorders of the digestive organs act in some of these cases as a predisposing cause, and in others as an exciting, or at least as a concurring cause, or in aiding to develope the operation of other causes, some of which may have escaped detection, and hence it may itself appear as the sole efficient agent in producing the neuralgic affection. In estimating the influence of disorders of the alimentary canal in producing this affection, too much has been imputed to it by some, and too little by others. MONTFALCON and ELLIOTSON believe that they have no influence in causing the complaint. This is, however, too extreme an opinion. Doubtless, some of the cases in which these disorders are very prominent, and in which the neuralgic suffering subsides upon their removal, may be viewed as associated effects of a pre-existing morbid condition, probably of the ganglial nervous system. But, that disorders of the digestive organs are without any influence in causing or developing neuralgia is not consistent with the evidence furnished by SWAN, BRODIE, ANDRAL, and others, and by my own experience. That paroxysms of the complaint are cured by cathartics, is an admitted fact; but Dr. ALISON believes that this circumstance proves nothing as to the influence of these disorders upon the complaint, for cathartics may produce a beneficial effect upon it by deriving the blood from the brain and spinal chord. Yet, admitting this effect of cathartics, still these disorders are not without some influence, and the fact is much too important to be disregarded in practice, however it may be attempted to account for it. I have, both in the article IRRITATION, and in other articles and works, attempted to show that disorders of the digestive organs, and even of other organs, as of the urinary, &c., may be directly extended by means of the ramifications of the ganglial system to distant internal organs in some cases, and be there expressed by spasmodic action, or morbidly excited sensibility; or to the roots or even to the ramifications of cerebro-spinal nerves, in other cases, giving rise to similar morbid manifestations of muscular motion and sensation. I have met with several instances in which fæcal accumulations in the cæcum and sigmoid flexure of the colon, and internal hæmorrhoids have been attended by severe neuralgia of the lower extremities, and as soon as these have been removed this affection has ceased. (See Notes and Appendix to *M. Richerand's Elements of Physiology, by the Author* (p. 546. 562. *et passim*), and article IRRITATION, *passim.*)

65. (*e.*) *Diseases of the urinary organs* sometimes give rise to severe neuralgic pains, generally

in the extremities. Instances of this cause of the complaint have been furnished by Sir B. BRODIE, Dr. ROWLAND, and others. Mr. SWAN mentions a case where severe pain of the backs of the fingers was induced by evacuating the bladder when much distended. A similar case was observed by the author, the pain being most severe under the nails, and along the backs of the fingers. I have seen stricture of the urethra apparently the cause of slight aguish attacks, and of intermittent nervous affections of a painful and spasmodic nature.

66. (*f*) That *irritation of the extremities of the nerves* will occasion neuralgia in some of the branches of the same, or of intimately-connected nerves, appears to be proved not only by the occurrence of this affection after superficial injuries and cutaneous eruptions (§ 63.), but also by the circumstance of severe frontal neuralgia having been caused by the larvæ of insects in the frontal sinus, a case of which occurred in a member of my own family; the larva escaped after a severe fit of sneezing, and the pain immediately ceased.

67. V. COMPLICATIONS.—Several of the pathological states just adduced as causes of neuralgia, may be considered with equal propriety as complications, or as associated results of some anterior disorder, particularly affecting the ganglial nervous system, as I attempted to show many years ago. The most common of these associations are irritation, congestion or other disease of the spinal chord or of its membranes; caries or inflammation of the intervertrebal substance or vertebræ; hysteria, and uterine disorders; epilepsy and other convulsive affections; disorders of the digestive organs; fæcal accumulations in the cæcum or sigmoid flexure of the colon, or disease of the rectum; ague, rheumatism, and catarrh; paralytic affections; internal abdominal and pelvic tumours; disease of the hip-joint, and psoas abscess. There are occasionally other complications of neuralgia met with in practice, but these are chiefly accidental, or at least less intimately connected than the above with this affection.

68. *A.* The connection subsisting between neuralgia and many of the disorders now enumerated is very obvious: certain of them, although frequently the primary affection, are sometimes consecutive, and more of them are merely consequences of pre-existing morbid conditions, one or other appearing earlier or in a more prominent manner in some instances than in others. *Diseases of the spine*, or *of the hip-joint, psoas abscess*, and *fæcal accumulations*, &c. in the large bowels, are generally a pathological cause of neuralgia, although often also associated results of previous disorder. The same remark applies also to other *derangements of the digestive organs*, to *hysteria*, and to *spinal irritation or congestion*, although they are more frequently pure complications than the foregoing. The occasional complication *of ague, rheumatism*, or *caturrh*, with neuralgia, — complications not infrequently observed,—are merely the associated effects produced by malaria, cold and wet, and currents of air. I have seen neuralgia conjoined with obscure or irregular attacks of ague, and as the former became less violent the true character of ague was more distinctly and regularly developed. In cases of sciatica the rheumatic character is often very prominent, or rheumatism of other parts sometimes alternates or is associated with the sciatic affection. The same is occasionally also remarked in respect of toothache and rheumatism of the face.

69. *B. Epilepsy* and *convulsive* or *spasmodic affections* are often the external manifestations of the same lesion which occasions neuralgia, the one alternating with or to a certain extent accompanying the other. Indeed, the same local lesion which produces intense pain, may in a different grade, or as it extends to the nerves of motion, occasion spasm or convulsion; and, in a still more advanced grade, *loss of sensation*, or *of motion*, or of both functions. Of this I have met with several instances, when the primary lesion was seated within the cranium or spinal canal. In some cases severe pain has been experienced in different parts of the lower extremities, afterwards the pain has been attended by cramps in the muscles of these extremities, or of the abdomen; these have recurred at intervals and have been followed by weak, imperfect, and irregular action of these muscles, giving the patient an unsteady, and partially paralysed gait, in some cases resembling paralysis agitans, in others chorea, or an intermediate state.

70. That neuralgia and epilepsy may be associated effects of the same lesion, the latter appearing consecutively on the former as the primary lesion increased, was demonstrated to me many years ago in the case of a compositor in a printing office, who complained of most severe neuralgic pains in the left hand, which generally originated in the situation where the metal composing-stick pressed most during his work. As the intensity of the pain increased, regular attacks of epilepsy supervened; but disappeared with the removal of the local affection and its cause. *Painters' colic* may be considered as a form of visceral neuralgia, and this affection I have seen associated with epilepsy on two or three occasions.

71. VI. TERMINATIONS AND PROGNOSIS.—Neuralgic affections terminate — 1st. in health; 2d. in some other disease; 3d. in death.—*A.* A *return to health* is a most frequent termination of neuralgia of the nerves of the lower extremities, whilst neuralgia of the face and head is most liable to prove obstinate, to return, or to terminate unfavourably. The result in all cases and seats of the affection depends upon the exciting cause of it. When it proceeds from malaria, or from cold and wet, or from any of the more passing and external physical causes, it is generally soon removed by decided means early prescribed. Yet, even in these cases, a first attack leaves behind it a predisposition to return upon exposure to the exciting causes, although those causes may be less energetic than those which first occasioned it.

72. *B.* When neuralgia cannot be imputed to these causes, — when it is occasioned by less manifest causes, — when there is reason to suppose that some organic lesion exists within either the cranium or spine, a protracted disease may be expected, and the *supervention of another malady*, generally resulting from the progressive increase of the primary lesion, and of a still more fatal tendency, may be anticipated, although at a more or less remote period. In a very large majority of these cases neuralgia terminates in some related malady — in a convulsive, epileptic, apoplectic, or paralytic seizure. From either of these the patient may recover partially, rarely completely, and be

again attacked, but he seldom experiences the neuralgic affection, or at least in the same form or degree of severity. Of the several maladies into which neuralgia passes, palsy, generally in the form of hemiplegia, sometimes in that of paraplegia, when the lower extremities have been the seat of the affection, has been that most frequently brought under my own observation. Next to this, apoplectic, or apoplectic conjoined with convulsive seizures have been noticed.

73. *C.* It is chiefly, if not entirely by passing into the apoplectic, epileptic or convulsive, or the universally paralytic states, that *this affection terminates in death*, such termination sometimes taking place more or less suddenly, upon the occurrence of the first seizure, or not until after two or more recurrences or exacerbations of the seizure. A gentleman from the country consulted me for facial neuralgia. He continued tolerably free from the affection during nearly two years, when a severe attack occurred, followed by convulsions, which rapidly passed into apoplexy and death. Another experienced an attack of apoplexy attended by convulsions, that supervened upon neuralgia. I found him partially recovered from this attack. He had been very largely blooded, and the pulse indicated an excessive loss of blood; yet another attack took place nevertheless, within 48 hours, and speedily terminated life. Whether or not he could have recovered from the first attack without the large depletion is difficult to determine. Still, as I have remarked in the Articles APOPLEXY and CONVULSIONS, I have rarely seen large blood-lettings beneficial, more frequently I have observed them prejudicial, in seizures attended by convulsions. In these cases, it is better to wait, or to employ other measures less likely to be prejudicial, than to bleed largely with the view of recovering the patient from the seizure, which cannot always be arrested at once, or recovered from under some time after having been developed. *Time*, I may here remark, is a necessary element in the process of recovery; and if due time be not allowed for the procession of phenomena terminating in a return to health, but disturbing, officious, or exhausting measures be adopted to hasten what admits not of being accelerated, serious mischief may accrue.

74. VII. THE APPEARANCES OBSERVED IN FATAL CASES, particularly of neuralgia of the face, have been the majority of those found in the membranes and substance of the BRAIN, and bones of the CRANIUM (see art. BRAIN and CRANIUM), more especially tumours, and ossific deposits in the dura mater, and near the base of the brain or cranium; exostosis, great thickening, and even caries of some parts of the cranial bones in the vicinity of the affected nerves; and many of the structural lesions already mentioned as pathological causes of the affection (§§ 62, 63.). Various changes of structure found both in the brain and membranes, and in remote viscera, may be only coincidences or the effects of protracted suffering upon the circulation in the brain. Softening of parts of the brain, effusions of blood, and even ossific deposits in the membranes, or in the coats of the arteries, sometimes observed in cases terminating in apoplexy or palsy, may be altogether or partly consequences of the repeated returns of the neuralgic affection; morbid sensation exciting, or otherwise changing, capillary action in related portions of the brain and its membranes. Still such cases as have been recorded by Sir H. HALFORD, TYRRELL, MONTAULT, and others, where bony deposits, fungous tumours of the dura mater, &c., implicating the fifth pair of nerves, compel our belief that these lesions have been concerned in causing the affection. In some cases of neuralgia of the lower extremities, signs of chronic inflammation of the trunk of the nerve, or the more usual consequences of this state of vascular action, particularly injection and enlargement of the capillaries of the nerve, thickening, discolouration, &c., of the connecting cellular tissue, have been remarked by COTUGNO, CIRILLO, SIEBOLD, BICHAT, ROUSSET, and SWAN; whilst in other cases no change could be detected in the nerves themselves by DESSAULT, WARDROP, BICHAT, ANDRAL, and others; nor even in the nervous centres, when the patient did not die of any of the diseases of these parts just mentioned, as frequent terminations of neuralgia. In cases of visceral neuralgia, inflammatory changes have been remarked in the ganglia by LOBSTEIN, SWAN, and others; but it is difficult to estimate the morbid amount of vascularity of these parts of the nervous system, as it varies very much in this respect even in health.

75. VIII. THE NATURE OF NEURALGIA must necessarily be estimated, 1. partly from the general character of the local and constitutional symptoms attending it; 2. partly from the appearances observed in fatal cases; 3. partly from its relation to other maladies, into which it often passes; and 4. partly from the influence exerted upon it by medicinal agents. — (*a*). That the local and constitutional symptoms accompanying neuralgia, are different from those of acute neuritis have been shown both in the art. NERVES (§§ 23. 27.), and above (§ 5.). Still there may exist, in some of the more persistent and continued, or even in the merely remittent states of neuralgia, chronic inflammation at the origin, or in some part of the trunk, of the nerve affected. The absence of fever and of tenderness on firm pressure, although indicating the absence of inflammation, in the majority of cases, still should not be estimated as precluding the existence of chronic inflammatory action in all of them. The absence of fever, &c., is no proof of the absence of the slighter states or more chronic forms of inflammation of the affected nerve or parts intimately related to it. In those cases where there is most reason to suppose that the complaint is independent of inflammation, the pulse even falls in frequency during the severity of the paroxysm. The absence, however, of all appearances and consequences of inflammation in some of the fatal cases prove strongly, that neuralgia is at least occasionally independent of this state of vascular action. The nature of the exciting causes, and the characters of the other diseases with which it is often allied, or into which it occasionally passes, indicate that neuralgia varies in its nature in different cases, — that it may proceed from chronic inflammatory irritation about the origin, or in the course of the nerve in some instances; and from a state of partial or slight pressure on the nerve in others. That it may even arise from a deficient or interrupted circulation of blood at the origin, or in the trunk of the nerve, is merely a supposition, that hardly admits of positive proof. The

circumstance of neuralgia terminating so frequently in palsy is no evidence of this being its immediate cause, for palsy proceeds more frequently from the consequences of inflammatory action in portions of the nervous centres related to the paralysed part, — from disorganisation or organic lesion, — from inflammatory softening, sanguineous effusion, &c., — than from deficient or interrupted circulation of blood, although this state of the circulation in parts of the nervous centres probably causes palsy in some instances.

76. Those cases of neuralgia which are unequivocally caused by malaria, which are completely intermittent, and which are devoid of febrile commotion, or of tenderness of the nerve upon firm pressure, may be viewed as non-inflammatory; but, it may be asked, what then is the nature of the affection? Does the disorder, in these cases, proceed from slight pressure of the nerve at its origin or in its course, or from a suppositious state of irritation, of which irritation we know as little as of the nature of the pain of which it is assigned as the cause? Is it merely a disturbance of function? The effect of treatment furnishes no very conclusive evidence of the nature of the affection, — not even of its inflammatory or non-inflammatory character. For even in those cases where evidence of the existence of inflammatory action is the strongest, even there an energetic exhibition of tonics, as of camphor, quinine, iron, &c., will often effect a cure. We know, at least I have fully satisfied myself, and I have shown in this work, that these remedies will often cure inflammations of the circulating vessels; and we may therefore infer that they may prove equally serviceable in neuritis; although we may find them still more beneficial in neuralgia of a purely non-inflammatory character.

77. Concluding, therefore, that those affections, to which the name neuralgic has been applied, may be viewed as more or less inflammatory in some instances, and non-inflammatory or functional in others, and that great advantages will accrue in practice from the science and acumen which enable the physician to distinguish between these, or to estimate how much of either character may be present, it will next be inquired, having found a certain palpable condition to which the disease is to be imputed only in some cases, to what is it to be attributed in those other instances where that condition is supposed not to exist? Now those other instances have been said to proceed from irritation, altering the sensibility of the nerve, which either is the seat of this irritation, or manifests it from an intimate relation to the irritated part. In these cases the violent pain is often the chief, if not the only cognisable disorder. Its dependence upon inflammation is not entertained for the reasons above assigned, in connection with its sudden occurrence, and as sudden cessation — phenomena hardly to be explained by assigning inflammation as their cause. The affection has been viewed as *functional* in such circumstances as *morbid exaltations of sensation*, as the result of *irritation* of the nerve or of parts related to it. This, however, is merely a play upon words — a confession of our ignorance; for, to say that intense pain is a morbid exaltation of sensation, is a consequence of irritation, is merely a nervous disorder or affection, and so on, is explaining nothing, is merely substituting terms for the concealment of our ignorance, or with the vain hope that we are evincing our knowledge.

78. Considerable practical knowledge of neuralgic affections has suggested the following inferences: — 1. That these affections often proceed from chronic inflammatory action in some part of a nerve, or of a part intimately related to it. — 2. That the exciting causes of the affection should be kept in view when we estimate the inflammatory or non-inflammatory character of it. — 3. That, even in those cases which present no inflammatory character, some pre-existing affection or disorder of related parts, especially of the nervous centres and internal viscera should be suspected and searched after. — 4. That, in the non-inflammatory cases especially, the neuralgic disorder should be generally viewed as an external manifestation of some latent internal disorder, which a patient investigation of the case, with due acumen, will frequently detect, and which, when once detected, will suggest the only permanently successful and safe indications of cure. — 5. That the connection of these affections with gout, rheumatism, hysteria, &c. should not be overlooked; nor the tendency they often evince to terminate in palsy, epilepsy, or apoplexy be neglected, in estimating the morbid relations and nature of individual cases, and in determining the indications of cure most appropriate to each. — 6. That the one-sided views published of the subject, the vaunted success of certain remedies for the cure of the affection, the publication of successful cases, to the neglect of the unsuccessful; and the silence as to the ultimate result of many cases, or as to the diseases which appeared at some period after a supposed cure, which has been preserved, have all tended to mislead the inexperienced as to these affections. — 7. That the suppression of the neuralgic affection by powerful tonics and stimulants, or by the more energetic narcotics, without due reference to, or an accurate estimate of, the states of the most important viscera, has sometimes proved injurious; and that, although the neuralgic affection has apparently ceased altogether, and for a considerable time, still some severe visceral disease, or an apoplectic, epileptic, or paralytic seizure not infrequently supervenes, and endangers, or carries off, the supposed case of cured neuralgia.

IX. TREATMENT OF NEURALGIC AFFECTIONS.

79. *A.* From what has been advanced above as to the *physical* and *pathological causes* and *associations of neuralgia*, it is obvious that our *first* and most strenuous endeavours should be directed to ascertain and to remove these. When the symptoms are such as indicate, or even to render very probable, the existence of an inflammatory state of the nerve, more especially in young, robust, or plethoric subjects, or when the disease has appeared after suppressed discharges, or the disappearance of eruptions, &c., the treatment in the first instance should be that advised for NEURITIS, more especially local *blood-lettings*, *derivatives*, and *counter-irritants*. I have seen recent attacks of neuralgia, with these characters, removed by these means alone, in a very short time. When any evidence is furnished of disorder in the nervous centres, or in any important viscus, the treatment suited to such disorder should be decidedly and promptly prescribed before the more common neuralgic remedies are had recourse to;

and in all complications, as well as in all instances caused by pre-existing disorder or lesion, the associated affection should receive immediate attention, and the means afterwards directed for the removal of the neuralgic affection ought to be such as may either not endanger a return of the complication, or may tend to its permanent removal. In such circumstances *blood-letting*, cautiously employed, is often extremely beneficial, and renders the means subsequently prescribed much more efficacious. The same remark applies to chologogue and alterative *purgatives* when thus early and appropriately prescribed.

80. *B.* Having removed the causes, as far as this intention can be accomplished, and had recourse to such antiphlogistic means as the state of the case and of the patient permitted, the morbid associations of the affection having received due attention, in the use of these and other remedies, the treatment may be directed more especially to the neuralgia, according to the characters it may present, and to the diathesis of the patient. In the distinctly intermittent form of the affection, and if there be no determination of blood to the head, or no active visceral disease, the preparations of iron, or of bark, or quinine, conjoined with such other remedies as the peculiarities of the case will suggest, may be given, or other remedies, about to be noticed, may be tried. At the same time that tonic, anti-spasmodic, anti-periodic, and narcotic medicines are being administered internally, various *external means* may be applied, according to the seat, character, and duration of the affection. In the cases caused by malaria or cold and humidity, quinine, cinchona, camphor, arsenic, &c., are especially appropriate. In the more strictly nervous or hysterical, and in cases connected with a deficiency of blood, the preparations of iron, of opium, of belladonna, &c., are most suitable. In the rheumatic and gouty diatheses, the fixed alkalies and alkaline earths with colchicum and ammonia, aconite with camphor, &c., are most successful, especially after biliary and other secretions have been evacuated by an active exhibition of chologogue purgatives.

81. *C.* When neuralgia appears to proceed from disease within the cranium, or near the origins of the affected nerves, as in the cases observed by myself and others, and already referred to, a seton or issue should be established in a situation selected with reference to the inferred lesion, and an alterative course of treatment, aided by narcotics, ought to be preferred, such as the iodide of potassium with liquor potassæ, Plummer's pill with soap and opium, the iodide of mercury with stramonium or belladonna. In some of these cases, the application of a few leeches behind the ears, or to the spine, when the latter is the seat of irritation, or a small cupping in the same situations, and the repetition of these according to circumstances, will prove of service.

82. *D.* Cases will occur of the failure of means directed according to the principles now stated; the utmost care in ascertaining the physical and pathological causes and morbid associations of neuralgia, and our best endeavours to remove them, being altogether unsuccessful. In these, we must have recourse to more empirical measures, yet even these measures must not be blindly, but rationally prescribed. This brings me to the consideration of the principal remedies which have been employed against this complaint, according either to rational views and principles of treatment, or to a vague empiricism. In noticing, therefore, these remedies, I shall mention the states of the disorder in which I believe each of them to be most appropriate, and the combinations in which my experience has shown them to be most efficacious.

83. *a.* Evacuants are more frequently required in neuralgic affections than has been generally inculcated; but not so much on account of any general fulness of the vascular system, as of local congestion, or an irregular distribution of the blood, owing to impaired tone of the vital energies generally, and to deficient or impaired secretion and excretion. — *a.* The propriety of having recourse to *bloodletting*, and particularly to local *bloodletting*, and even the repetition of it in some instances, and the circumstances requiring this treatment, have been already noticed (§ 79.). — *b.* *Emetics* have very rarely been advised in neuralgic disorders, and yet cases occasionally are met with in which an emetic proves a good initiative remedy, particularly in promoting the removal of vitiated secretions from the biliary passages. Emetics are indicated chiefly in neuralgic affections of the trunk, or where there is evidence of congestion and impaired function of any of the abdominal viscera.

84. *c.* *Purgatives* have been very generally recommended. They are beneficial not only as evacuants of morbid secretions and fæcal accumulations, sometimes the primary source of irritation, but also as derivatives, particularly when the more drastic purgatives are prescribed. They, moreover, promote secretion and excretion, and remove visceral congestions. Sir C. Bell and Dr. Allnatt have praised the decided exhibition of *croton oil* as a purgative, and some more recent observers have noticed its good effects, and have viewed it as exerting an alterative effect similar to that produced by colchicum upon the urinary functions. I gave it many years ago in a case of neuralgia of the right pillars of the fauces and side of the tongue, and the patient continued free from the disease for more than a year, when an attack occurred and proved much more obstinate than the former, the means, which were formerly successful, failing on this occasion. *Chologogue purgatives* are often preferable to any other when prescribed with decision, and aided by anodynes. In 1820 I treated a case of infra-orbital neuralgia, and in 1821 a case of sciatica, as follows: —

No. 296. ℞ Calomelanos gr. xij; Pulv. Ipecacuanhæ, Pulv. Opii, āā, gr. ij. Mucilag. q. s. *m.* Fiant Pilulæ iij, horâ somni sumendæ.

No. 297. ℞ Infusi Sennæ Comp. ℥vss; Magnesiæ Sulph. ℥ss.; Magnes. Carb. ʒss.; Vini Colchici ʒjss. Tinct. Sennæ Co. ʒiij; Tinct. Cardamom. Co. ʒij; — Tinct. Opii, ♏ xv. *m.* Fiat Mist. cujus capiat partem tertiam ter in die. (Horâ 7a A. M., horâ 11a A. M., et horâ 3tia P. M.)

85. In these cases the complaint was removed in four days, alleviation of suffering being apparent in both within twenty-four hours after the first dose of pills. Rahn, Wilson, and many others have recommended cathartics, and when there is little or no visceral obstruction or congestion, any of the more active and certain purgatives may be prescribed, particularly when a derivative operation merely is desired to be produced. In neuralgia, however, of the lower ex-

tremities, I have preferred equal parts of *spirits of turpentine* and *castor oil* (℥ss. of each) taken on the surface of mint-water or milk, containing some calcined magnesia, to other purgatives, calomel with colchicum and ginger, or calomel with ipecacuanha and opium, being given occasionally at night when visceral obstruction or congestion was present. Purgatives are more particularly indicated in neuralgia of the lower extremities which is not infrequently induced by fæcal accumulations in the colon and sigmoid flexure of the colon. Their good effects are often promoted by an occasional enema with ol. terebinthinæ and castor oil.

86. *β.* Alteratives and Deobstruents are especially indicated when neuralgia appears to depend upon visceral obstruction or structural change near the origin or in the course of the affected nerve, and in cases of visceral neuralgia. Under this head may be comprised various substances, whose beneficial operation may be differently explained. The alteratives most frequently employed are the preparations of *mercury*, of *iodine*, and of *arsenic*, variously combined. — *a.* Dr. Corkindale prescribed *calomel* with opium, and Loebenstein-Loebel, calomel with the golden sulphuret of antimony and opium, until the gums became affected. Hildenbrand and Herrmann often pushed *mercurials* to the production of salivation. Schlesier preferred the bichloride of mercury, two grains of it being dissolved with three grains of the extract of stramonium in an ounce and a half of distilled water, and from thirty to fifty drops being taken every second hour.

87. *b.* I have given the preparations of *iodine*, particularly the iodide of potassium with liquor potassæ and narcotics, the iodide of mercury, and the iodide of iron. The first and second of these preparations are most appropriate when the complaint appears to depend upon organic change within the cranium or spine; the last where it is more strictly nervous, and where it is connected with uterine obstruction. In some neuralgic affections referable to the diaphragm, heart, and stomach, or passing from the one to the other, and presenting a gouty character, the iodide of potassium, with liquor potassæ and opium, was extremely beneficial.

88. *c.* The preparations of *arsenic* are more strictly alteratives and antiperiodics than tonics. They have been very generally prescribed for neuralgic complaints. They have been much confided in by Nesse-Hill, Bassedow, Bedingfield, Halliday, and Rowland. They are most successful in the more functional states of the complaint, particularly when they are caused by malaria, and exposure to cold. They are also serviceable in those forms of it which are intimately allied to hysteria and are associated with congestion of the uterus or with disordered menstruation. They may be conjoined with any of the narcotics hereafter noticed (§ 96. *et. seq.*).

89. *d. Spirits of turpentine*, as usually given for the cure of neuralgia, acts more as an alterative than as a stimulant, diuretic, and aperient, in all which ways it exerts considerable influence. Dr. Home (*Clin. Experim. and Hist.* p. 247.) remarks, that having found, in one of Dr. Cheyne's philosophico-medical works, a receipt composed of oleum terebinthinæ and honey for the cure of sciatica, he tried it and found it to succeed; and that he has used it for many years and found it "an efficacious and valuable medicine." Dr. Darwin (*Zoonomia*, vol. ii. s. iii. ch. 2.) also had recourse to oil of turpentine, both in this form of neuralgia and in lumbago. It was afterwards prescribed by myself, and the results of my experience of it in neuralgia and many other diseases, published in the *London Medical and Physical Journal* for August 1821. M. Martinet also about the same time recommended it for sciatica. Pitcairn, Cheyne, and Home, who first employed this substance against sciatica, usually gave in doses of about fifteen or twenty drops in the form of linctus with honey. At first I prescribed it as follows in neuralgic affections, but I subsequently varied the dose and the modes of exhibiting it, with the circumstances of the case, seldom giving less than half a drachm for a dose.

No. 298. ℞ Olei Terebinthinæ; Tinct. Guaiaci Ammoniatæ, āā, ʒ iij; Mellis Opt. ℥ ij; Olei Cajuputi ♏ xii; Olei Limonis ♏ vi. Misce ut fiat Linctus: Cochleare unum minimum bis terve de die sumendum.

This medicine, although recommended chiefly for sciatica, is frequently of great service, if not equally beneficial, in other forms of neuralgia; for all which it may be employed in various forms, as with calcined magnesia, on the surface of milk, or of an aromatic water, &c. When the eructations, &c. after taking it are unpleasant, magnesia is often of service, and moreover promotes its operation on the bowels. Sometimes a large dose of the turpentine — from three to six drachms — taken at once or with half an ounce of castor oil, on the surface of milk or mint-water, almost immediately removes the complaint. In neuralgia of the lower extremities enemata containing it are often beneficial. Cheyne recommended equal parts of spirits of turpentine and alcohol to be distilled together, and from one to four drachms of this compound to be taken daily. He supposed that, in this manner, the turpentine was deprived of many of the inconveniences attending it in other forms. Turpentine has lately been much employed, particularly in sciatica, in France and Germany, where it has received the praises of Elgenstierna, Cloquet, Larroque, Dufaux, Piorry, Trousseau, Most, Ducrois, and others. A strong recommendation of this medicine is to be found in its being equally appropriate to the inflammatory and non-inflammatory states of the affection; and in the fact of relapses or a return of the complaint being less frequent after the use of it, than after any other remedy.

90. *e.* The use of *cod-liver oil* may be noticed at this place. It has been long recommended for rheumatism and sciatica, and more recently for the several forms of neuralgia. As usually prepared and kept, it is a nauseous medicine; and I doubt much its efficacy over the oil procured from the livers of several other fish. That obtained from the liver of the skate is equally beneficial; and that yielded by the liver of the ling superior to both. But the oil from the liver of the torsk, or the *gadus brosma*, a remarkably fine fish caught only on the coasts of Shetland, Faroe, and of some parts of Norway, is esteemed much above all others by the inhabitants of these parts, and is much employed by them as a domestic medicine; the fresh liver and oil being considered an article of great delicacy, when cooked in such a way as to prevent, as much as possible, the separation of

the oil from the liver.* The quantity of these oils which may be taken for neuralgic and rheumatic complaints is as much as the stomach will tolerate.

91. γ. Stimulants, Tonics, and Antispasmodics. — There is scarcely a substance which may be ranked under this head, that has not been tried against neuralgia. — *a*. The preparations of *cinchona* and the sulphate of *quinine* have been very generally used: the latter, however, has recently superseded the former, although not always with justice. The more energetic preparations of cinchona, conjoined with very full doses of the alkalies or alkaline carbonates, or with opium, as advised by Schenk and Kerrison, or with the sulphuric æther, as prescribed by Lassere, have succeeded in some cases where quinine has failed. The *sulphate of quinine* has, on the other hand, been said to succeed when cinchona in decoction or powder has been unsuccessful. When, however, the bark has been given as just advised, or with serpentaria, capsicum, camphor or ammonia, or with chlorate of potass, much more dependence may be placed on its efficacy. I have rarely trusted to quinine alone in this affection, but have prescribed it with the sulphate of iron, camphor, capsicum, and extract of conium or henbane, after the bowels have been freely evacuated by suitable purgatives. In a most severe case of sciatica of which a surgeon retired from service in India was the subject, this latter combination proved very quickly and permanently efficacious. Both bark and quinine are most successful in cases caused by malaria or by wet or cold, and when the affection is intermittent or is chiefly functional. They often fail when the complaint presents remissions only, when it appears to depend upon chronic inflammatory action or upon a permanent source of irritation. If employed at all in these cases, local bloodlettings and active purgatives should precede them, the latter being given from time to time during their use.

92. *b*. The *preparations of iron* have obtained great reputation for the cure of neuralgia, especially since the *sesqui-oxyde* was recommended for it by Dr. Hutchinson, and given in large doses by Elliotson and others. The full efficacy of this substance may be obtained in doses of from half a drachm to a drachm, three or four times a day, conjoined with an aperient, or a smart purgative being given occasionally. This and the other preparations of iron are indicated chiefly in the same circumstances of the complaint as have been just stated to require cinchona or quinine; and when there is a deficiency of blood, or at least no general plethora or inflammatory action. The *sulphate of iron* is often not less beneficial than the carbonate, and it may be prescribed with other medicines as above stated (§ 91.). The *hydrocyanate of iron* has been used by MM. Dupuy and Jolly in the following form: —

No. 299. ℞ Hydrocyan. Ferri gr. xviii.; Quininæ Sulph. gr. xii.; Extr. Opii gr. i.; Conserv. Rosæ q. s. ut fiant Pilulæ xii. Capiat unam 2dis vel 3tiis horis.

93. *c*. The preparations of *zinc* have been prescribed for neuralgia, but chiefly in combination with some one of the narcotics about to be noticed. The *sulphate* was preferred by Meglin, and the chloruret or *chloride* by Hanke, who directs one grain of it to be dissolved in two drachms of chloric æther, and from five to ten drops of the solution to be given every fourth hour in sugared water. The *chlorate of potash* has been praised by Helmenstreit and Meier, who gave it in doses of from three to five grains every fourth or fifth hour. I have prescribed it in somewhat larger doses in the decoction of bark or infusion of valerian. It is not devoid of efficacy in the rheumatic and hysterical states of the disease.

94. *d*. *Nux vomica* and *strychnia* have lately been suggested in the treatment of neuralgia. Linnæus gave the former in gastralgia; and I have prescribed the alcoholic extract of it in a few instances — in one or two with decided service, but in others with doubtful advantage. This preparation is in many respects preferable to strychnine, both in this and in paralytic affections; but it is not suited to the more continued and inflammatory states of this disorder. The same remark applies to *Phosphorus*, which has been employed by Lœbenstein-Lœbel, dissolved in oil, of which, however, I have had no experience.

95. *e*. Of *camphor*, given in tolerably large doses, with opium or some other narcotic, or with quinine or sulphate of iron, I entertain a favourable opinion, as well as of *valerian* and *guaiacum*, the ammoniated tincture of these being the preparations I have preferred. Schneider employed the oil of valerian both internally and externally by friction. The preparations of guaiacum with colchicum or, with aconite, and the alkaline carbonates, are most useful in the rheumatic forms of neuralgia. *Musk* has been prescribed by Beaumes, and by J. Frank conjoined with calomel and antimony.

96. δ. Narcotics and Sedatives. — *a*. The several preparations of *opium*, and more recently the salts of *morphia*, have been prescribed in this class of affections, in various combinations, and with different effects. I have found them of service in full doses with calomel, camphor, and ipecacuanha, particularly in sciatica, after the bowels have been freely evacuated; and in *toothach*, *opiates* with camphor, creasote, and capsicum, applied to the gums, or to a carious tooth, often affords relief. Recamier advises the following pills in neuralgia: —

No. 300. ℞ Pulv. Opii puri; Pulv. Ipecacuanhæ, āā, gr. iij; Camphoræ; Ammoniæ sesquicarb., āā, gr. xij.; Mucilag. Acaciæ q. s. *m.* Fiant Pilulæ xx. Capiat j. ad iij. 2dis vel 3tiis horis.

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* Of the oil from the livers of the torsk, ling, and cod, I can speak from experience. When obtained from the fresh livers, and used before it becomes rancid, it is not unpalatable, and does not offend the stomach. The fishermen in the parts above mentioned usually employ it as the only sauce to either of these fish; and I have very frequently partaken of it in this manner, and esteemed it above any other sauce. But the livers of these fish (that of the torsk more especially, it being prized much above the others), when prepared in the following way, are admirable articles of diet for the complaints under consideration, as well as for rheumatism and some others. The stomach of the fish is well washed, two parts filled with the fresh liver, and firmly tied at each end, so as not to allow any of the oil to escape whilst being boiled. When ate quite warm, with a little salt and spice, the liver still containing the greater part of its oil, this is very palatable. The fresh livers of these fish, and also of the young coal-fish and haddock, are prepared in various other ways as articles of diet, or they enter into the composition of several dishes much relished in the countries I have mentioned. I may add, that they often served me as articles of diet very many years ago; and that I now would as soon partake of them as of turtle or venison, although no lukewarm admirer of these admirable articles of diet, which, when excellent of their kind, gratify the palate, humour the stomach, and harmonise all the organic functions.

97. *b. Aconite* was first prescribed in neuralgia by Murray; but it was previously used in rheumatism. More recently it has been much employed in neuralgic affections by Jahn, Tealier, Hufeland, Turnbull, and others. Spielmann advises it to be given with the golden sulphuret of antimony; Rademacher with the decoctions of guaiacum and sassafras; Wildberg with the succinated spirit of ammonia, the galbanum plaster with opium being employed externally; and Fritze with the boracic acid. I have prescribed it with the biborate of soda. The preparations of aconite that are chiefly to be depended upon, are the alcoholic *extract*, and the *tincture*, both for *internal* and for *external* use (§ 110.), but they are most quickly efficacious when applied externally. Aconite has succeeded in several cases in my practice, but it failed very recently in a case of femoral neuralgia. It is, however, a very valuable remedy, particularly in the rheumatic forms of the complaint, and in neuralgic affections of the heart and diaphragm, as well as of the nerves of the trunk and extremities. It is not indicated in the inflammatory states of the disease; and it should not be given in these until local depletions have been resorted to. The modes of exhibiting it advised by Hufeland and Jahn deserve notice:—

No. 301. ℞ Extr. Aconiti; Calomelanos, āā, gr. ij.; Resinæ Guaiaci ʒss.; Sulphureti Antimonii Aurei gr. ij.; Olei Valerianæ Ætherei ♏ij.; Sacchari Albi ℈j. *m.* Fiat Pulvis. Capiat dimidium mane nocteque.

No. 302. ℞ Extr. Aconiti, ʒss.; Extr. Conii; Res. Guaiaci; Assafœtidæ, āā, ʒj.; Calomelanos gr. xv. *m.* Fiant Pilulæ sing. gr. iij. Capiat iij. ad vj. ter quotidie.

98. *c. Belladonna* has been very generally prescribed in neuralgia. I have given it with camphor and sulphate of quinine; and at the same time applied it externally, as about to be noticed (§ 111.). In some instances I have found it occasion stupor and malaise without materially relieving the pain. M. Trousseau has advised the extract of it, in doses of a quarter of a grain, to be given every hour until it causes vertigo, and then it is to be taken at longer intervals. He also has given it with sulphate of quinine, or with preparations of iron; or he has exhibited these after the narcotic effects of the belladonna had become manifest. Siebold, Thompson, and Deleau have recommended it to be employed both internally and externally. Pereira considers it inferior to aconite in this disorder.

99. *Stramonium* has also been extensively used in neuralgic affections. Lentin prescribed it in the form either of tincture or of extract. It has been favourably mentioned by Marcet, Trousseau, Begbie, Vaidy, Richter, and others. It is advantageously given with camphor and ipecacuanha. Dr. Rowland found it to succeed only in three cases out of ten, and in these three, partially in two, and completely in one. Dr. Elliotson considered it most useful in enteralgia.

100. *d. Conium* was strongly recommended by Fothergill for this affection. It afterwards fell into disuse; but it has since been favourably mentioned by Chaussier, Dumeril, and Rowland. The reputation of *Hyoscyamus* is probably equal to that of conium in the treatment of neuralgia. Breitung prescribed the extract of it with calomel; and Herison the tincture, with the tincture of guaiacum. It enters into the composition of the pills of Meglin, which have obtained some notoriety in this complaint:—

No. 303. ℞ Extr. Hyoscyami; Extr. Rad. Valerianæ; Oxydi Zinci, āā, ʒj. *m.* et divide massam in Pilulas lx. Capiat j. vel. ij. 2dis vel 3tiis horis.

101. *f.* The *Rhus Toxicodendron* has been advised for neuralgic affections, but it has never come into general use. Anderson gave three grains of the powdered leaves three times a day; and Goeden prescribed the resin of guaiacum, the powdered leaves of the toxicodendron, and calomel in the form of pills.

102. *g. Colchicum* has not been so generally employed in this class of affections as it deserves; and it has not proved so successful in some of the cases in which it has been prescribed as it might have been, if it had been given in those forms and combinations in which I have found it beneficial in these affections. In some persons, especially in those subject to visceral neuralgia, it is very liable to occasion remarkable depression of nervous power. It should therefore be exhibited with much caution, and in conjunction with stimulants or tonics. Accumulated fæcal matters and morbid secretions should be evacuated before it is taken. I have found it most serviceable when given with ammonia, or camphor, or with cinchona and an alkaline carbonate,—the powder of the cormus, or the extract with sulphate of quinine and camphor, or with sulphate of iron and powdered capsicum, in the form of a pill;—the tincture or wine, with the decoction, and the compound tincture of cinchona, and the sesquicarbonate of ammonia, or the carbonates of the fixed alkalies;—or any of the preparations of this plant with magnesia, and appropriate stimulants and restoratives. I prescribed, in 1820, for a lady in Walworth, suffering a most acute attack of facial neuralgia, colchicum, with the decoction and compound tincture of cinchona, the sesquicarbonate of ammonia, and the tincture of capsicum, after the bowels had been completely evacuated by means of chologogue purgatives. The removal of the attack was rapid, and the patient did not experience a return of it for some years. Some years afterwards I had recourse to the same combination for neuralgia of the muscles of the arm, in a young gentleman who had experienced a very severe epileptic seizure, for which he had been largely blooded and much reduced. It was continued during a few days, and was aided by active purgatives. The neuralgic affection ceased; but some months afterwards he was again seized with epilepsy, a physician saw him in my absence, and directed bloodletting, which was followed immediately afterwards by another attack of epilepsy and paralysis of the arm, formerly the seat of neuralgia.

103. *h. Hydrocyanic acid* is often of service, but chiefly in cases of visceral neuralgia, more particularly gastralgia and enteralgia. I have found it successful in some cases in which colchicum produced remarkable depression. It may be given with camphor, the sesquicarbonate of ammonia, or with other stimulants and restoratives, or with carminatives. When visceral neuralgia is complicated with anæmia, it may be prescribed at the same time with the salts of iron.

104. ϵ. Sialagogues and Errhines were formerly much employed in painful affections of the head and face; and in some forms and cases of

facial neuralgia they may still be employed with some hopes of benefit. When it is considered that the substances which are used locally as *errhines* or as *sialagogues* act directly upon branches of the trifacial nerves,— upon ramifications of the very nerve which is generally the seat of the affection, — the modern neglect of these means is deserving of remark.—*a*. Errhines, however, should be used with caution when there is reason to infer any serious affection of the encephalon, or active determination of blood to, or congestion in, that organ. As respects the choice of substances which may be used in this way, those which most efficiently promote a discharge from the pituitary membrane are the most efficacious. Sugar, in a fine powder with a small quantity of black pepper or capsicum intimately mixed in it; the various kinds of snuff; and powders containing a small proportion of veratrum or of asarum, may be employed, according to the circumstances of the case.

105. *b. Sialagogues* and *masticatories* may be used without any risk in all cases. Tobacco is the common local sialagogue amongst sailors, and the community of the United States of America; and is probably both a cure and preventive of facial neuralgia and toothach in many instances, particularly of the latter form of the disorder. But the continued or frequent use of this substance as a masticatory proves injurious to the digestive organs, and to the organic nervous energy, owing to the quantity of saliva imbued with the juice of it which is swallowed. When it is desirable to use any of the warmer substances as a masticatory, horse-radish, ginger, mezereon, pellitory of Spain, or capsicum, may be selected. If a tonic and antiseptic be preferred, the betel nut, catechu, myrrh, the astringent barks, &c. may be employed. If a refrigerant be indicated, camphor, alum, sal ammoniac, &c. may be used. For *toothach* several substances have been employed as masticatories or as sialagogues with advantage, and various combinations of them with narcotics, or with antiseptics, have been resorted to. Thus camphor dissolved in the tinctures of opium and capsicum, creasote being added to the solution, acts both as a sialagogue and as an anodyne in this complaint, when applied by means of a piece of lint or cotton to the gums or to a diseased tooth.

106. ζ. External Modes of Medication have been resorted to in neuralgic affections, in almost endless variety.—*A*. Of *local bloodletting* notice has already been taken, and the propriety of it vindicated in many instances and wherever a chronic state of inflammation of the nerves is inferred to be present. Various modes of employing *galvanism*, *electricity*, and, more recently, *electro-magnetism*, have been adopted by Andry, Thouret, Lebreton, Bally, Harris, and Harles. *Acupuncture* has been recommended by Recamier, Bergamaschi, Sachs, Churchill, and others, especially in sciatica. Of these means I have had no experience. The *affusion of cold water*, the *shower-bath*, and *cold salt-water bathing* have been severally advised; but they may be hurtful more frequently than beneficial, if they be not prescribed with discrimination, and if they be not immediately followed by frictions, and other means to secure reaction.

107. *B. The strictly local applications* to neuralgic parts are numerous. They may be arranged into — 1st. Those which are intended to alter the sensibility of the affected nerve, without causing vesication or suppuration; — 2d. Those which, by causing vesication or suppuration, in addition to the local excitement, may thereby more permanently impress and change the morbid affection; — 3d. Those which may still more powerfully affect the seat of disorder, by being applied more immediately to the nerves and capillaries in the vicinity, and after the cuticle has been removed; or those which admit of being *endermically* prescribed; — and 4th. Those which interrupt the communication between the seat of the affection and the sensorium; and which may remove the cause of irritation in the part affected.

108. *a. Those applications which are intended to alter the sensibility of the affected nerve, without causing vesication or suppuration* consist chiefly of compresses, epithems, cataplasms, pomades and ointments, frictions with ointments or liniments, embrocations, and plasters. — (*a.*) *Compresses* and *Epithems* of various kinds have been prescribed by Ricotti, Mondière, and others; and the chief of these are, compresses moistened with cold water, or with a solution of prussic acid, or with laurel-water. Epithems with a solution of corrosive sublimate (4 grs. to ℥j. of distilled water) have even been resorted to by Wedekind and Fleischmann. Hufeland advises compresses moistened with equal parts of laurel-water, Goulard's lotion, and rose-water, or with this last somewhat in excess. Trousseau recommends an epithem of a decoction of stramonium (℥j. of the plant to lbj. of water).

109. (*b.*) *Cataplasms* or *poultices* containing various active substances have sometimes proved beneficial. The powdered leaves of hyoscyamus, of conium, of tobacco, and of the solanum nigrum, have been made into poultices with linseed meal and decoction of poppies, and applied to the affected part. Poultices containing one or more of these, and some stimulating or irritating substance, as capsicum, mustard, &c., so as to conjoin a narcotic with an irritant or rubefacient effect, have likewise been advantageously applied.

110. (*c.*) Various *pomades* and *ointments*, with or without friction, have been recommended — those containing the extract of belladonna, or the acetate of morphia, by Lambert, Bartels, Lesieur, &c.; — those containing the iodides of mercury, by Thompson and Scott, or the iodide of potassium; — those containing the sub-carbonate of lead, by Ouvrard; — and those with veratria, aconite, &c., by Turnbull, Rowland, and others. Several of these are more serviceable when applied by friction, so as to occasion considerable rubefacient effect, as those with the iodides of mercury or of potassium, or with veratria or aconite.

111. (*d.*) *Frictions with stimulating liniments* or with strong solutions of *narcotic substances*, or with both conjoined, have been employed. Colville found frictions with tar of service; and Todd derived advantage from friction with a strong solution of extract of belladonna (ʒij. of extr. in ℥j. of water). I have had recourse to friction of the affected parts with narcotic and rubefacient substances conjoined, and frequently prescribed the following with marked benefit: —

No. 304. ℞ Linimenti Camphoræ Co.; Linim. Terebinthinæ, āā, ℥jss.; Olei Olivæ ʒijss.; Olei Cajuputi ʒjss.; Extr. Belladonnæ (vel Tinct. Alcohol. Aconiti) ʒiij. Misce, ut fiat Linimentum.

112. (*e.*) *Embrocations* with various substances have proved equally serviceable with any of the foregoing applications. Warm flannels, or several folds of cotton made warm, and thoroughly imbued with any of the *liniments* referred to in the Appendix (F. 295—314.), or with the liniment just prescribed, and then closely applied to the affected part, and covered by a warm napkin, or by oiled silk to prevent evaporation, are often of essential service in most of the varieties of neuralgia, particularly when renewed from time to time or according to the effect produced.

113. (*f.*) *Plasters* of various kinds have likewise been placed on the part, and some of them have been intended to produce a rubefacient, in addition to their other effects. Those plasters which contain *belladonna*, or both this narcotic and *camphor*, have usually been preferred. M. TROUSSEAU has employed the extract of *stramonium* in this manner. The following plaster has been frequently applied in sciatica: —

No. 305. ℞ Ceræ Albæ ℥j.; Olei Terebinthinæ ℥ss. leni igne colliquefactis, adde Pulveris Euphorbiæ ℈j. — ʒss. *m.* Fiat Emplastrum.

114. *b. Various means of producing vesication, pustulation, or suppuration,* have been resorted to for this complaint. — (*a.*) *Blisters* applied, and even repeated, in the course of the nerve, have been praised by COTUGNO, MAGENDIE, and others. *Moxas* have likewise been recommended by BONTIUS, COTUGNO, LARREY, BARRAS and WALTHER. Compresses moistened with a strong solution of tartarized ointment, and applied until redness or pustulation is produced, has been prescribed by MAGRI; but an ointment containing the tartar-emetic, or mercurial ointment with it (ʒj. of ant. tart. and ℥j. of the oint.) as used by SCOTT, is more immediate and certain in its effects than the solution. *Issues* and *setons* have been employed in the more obstinate or chronic cases. For sciatica they may be placed near the trochanter major, and, in cases of facial or occipital neuralgia, particularly when there is reason to dread organic lesion near the base of the cerebrum or cranium, they may be inserted in the nape of the neck, or somewhat higher, or even in the occipital scalp.

115. *c. Applications to the affected part after the cuticle has been removed from the surface,* — or *endermic medication,* as it has been termed, — have been frequently tried in neuralgia, and recommended by TROUSSEAU, RICOTTI, BONNET, ANSIAUX, RADIUS, and others. Various narcotic substances have been thus employed; but the acetate of morphia, sprinkled over the surface thus denuded of its cuticle, or ten grains of the acetate intimately mixed in from one to two drachms of an ointment, a portion of this being applied to it, and an ointment with a small portion of the extract of belladonna, are the means most frequently selected, although various other substances may be similarly applied.

116. *d.* The *affected nerve* in some instances *has been divided* above the seat of pain, in order to interrupt the communication between the seat and the sensorium; but there are very few cases on record, in which this measure has succeeded beyond a short period, or given permanent relief. When there is reason to infer the existence of any irritating substance in the nerve or part affected, the removal of it, if this be at all possible, should be attempted; and, when the affection seems to proceed from the exposure of a fibrile of nerve in a cicatrix, or from the irritation of an eruption, the application of a caustic to the former, suppuration being afterwards promoted, and of appropriate means to the latter, according to its nature, is chiefly indicated.

117. *C.* The *diet and regimen* for neuralgic patients must necessarily depend upon the peculiarities, causes, and complications of individual cases. In most instances, however, regular and abstemious living; due exercise in the open air; the avoidance of all depressing physical and mental causes; and a pure, dry, and moderately warm air, avoiding all injurious exposures, night air, dews, and crowded assemblies, are most conducive to recovery, and to the prevention of those recurrences of the complaint, to which all are subject who have once been tormented by it. Above all, the predisposing and exciting *causes* (§ 52. *et seq.*) should be guarded against; the stomach preserved in good humour; and all the secretions and excretions healthily promoted, without being inordinately increased — or increased so as to occasion debility. In some instances, a course of *chalybeate* or *alkaline mineral waters* proves of service, after appropriate medical treatment has ceased; and when the complaint has been caused by malaria, cold, and other physical influences, these are often extremely beneficial, when the state of the digestive organs receives due attention.

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NIGHT-BLINDNESS AND DAY-BLINDNESS. — *Nyctalopia* and *Hemeralopia*. —

SYN. — NYCTALOPIA, *νυκταλωπια* (from *νυξ*, night, and *ωψ*), Hippocrates, Galen. *Nyctolopia*, Pliny, Linnæus, Vogel. *Visus diurnus*, Boerhaave. *Amblyopia crepuscularis*, Sauvages. *Paropsis noctifuga*, Good. *Dysopia tenebrarum*, Cullen. *Aveuglément de nuit, vue de jour*, Fr. *Nachtblindheit*, Germ. *Cecita di Notte*, Ital. *Night-blindness*, *Day-sight*, *Hen-blindness*, Guthrie.

HEMERALOPIA (from *ἡμερα*, day, and *ωψ*, eye). *Amblyopia meridiana*, Sauvages. *Visus nocturnus*, Boerhaave. *Photophobia*, Plenck. *Dysopia luminis*, Cullen. *Visus acrior*, Darwin. *Paropsis lucifuga*, Good. *Oxyopia*, *Luscitio*, Auct. *Homeralopie, vue de nuit*, Fr. *Tagblindheit*, Germ. *Cecita di giorno*, Ital. *Day-blindness*. *Night-sight*.

CLASSIF. — IV. CLASS. I. ORDER (*Cullen*). — IV. CLASS. II. ORDER (*Good*). — I. CLASS. III. ORDER (*Author*).

1. DEFIN. — *Obscuration or loss of vision by night only* (Nyctalopia); *or by day only* (Hemeralopia).

2. It has been justly remarked by Dr. FORBES, that the two terms, *nyctalopia* and *hemeralopia*, have been inextricably confused, by being taken respectively by different authors to mean the same thing; one terming night-blindness, *nyctalopia*, and another *hemeralopia*, while day-blindness has been equally designated by both terms. He has, therefore, assigned the meaning which he would attach to each of them, and conformably with what appears to him, and not unreasonably, as their derivation, he defines nyctalopia to be vision obscured by day but good at night, and hemeralopia to be vision obscured by night and distinct by day. These meanings are opposed to those which I have assigned to the terms in question, and which are those most generally received; the "a" in the middle of each of the words being manifestly viewed as privative.

3. Of the two disorders of vision about to be noticed, *night-blindness* is the most frequently observed, and the most generally functional. *Day-blindness*, when at all marked, is symptomatic of vascular irritation, or inflammatory action in the more interior or posterior textures of the eye. Still, in its slighter states, it may depend upon similar pathological causes to those which occasion night-blindness, but cases of this kind are extremely rare.

4. i. PHENOMENA. — In persons suffering under this complaint, vision becomes gradually indistinct as the light of day disappears, until it is entirely suspended. The blindness continues during the night, and ceases with the return of day-light; but its degree varies in different cases, and in the same case with the duration of the disorder. At first, or in slight cases, the blindness is partial, and objects may be seen with a strong artificial light; but as the complaint advances, vision becomes so impaired that the moon or stars cannot be discerned, nor even the light of a candle placed at a short distance: more frequently, however, an artificial light may be discerned, but not the bodies in its vicinity. In the more prolonged cases, blindness is sometimes so complete, that an object cannot be seen after sunset in the brightest artificial light. Generally the sight is restored as day-light returns, and it again becomes perfect when the sun has arisen above the horizon; blindness and vision continue in this to correspond with the setting and rising of the sun. The approach and remission of the paroxysms at sunset and sunrise are generally gradual; but, in some cases, more or less sudden. If the disease be allowed to continue, the eyes may ultimately become so weak during day-light, that the direct or reflected rays of the sun cannot be endured without much uneasiness and indistinctness of vision; a certain degree of *hemeralopia* thus following obstinate or

prolonged *nyctalopia*. In some, also, of these severe cases, and even when this irritable state of the eye has not been induced, the patient is incapable, when placed in an obscure situation, of distinguishing objects by day as by night.

5. Usually no uneasy sensation or visible alteration of the eye is present. The state of the pupil is variously described by authors. Some say that it is immoveable and contracted, others that it is dilated. This discordancy probably arises from the pupil having been observed at different stages of the complaint or at different periods—at night or during day only. Mr. BAMPFIELD is not always consistent with himself, when noticing this symptom. He states that, after the disorder is far advanced, the pupil is often contracted, and the patient evinces painful irritation of the eyes, when exposed to a vivid light or when looking upwards; and that it is considerably dilated both by day and night, in the proportion of about one case in twelve; and at night it is often dilated, and neither contracts nor dilates, when exposed to the moon or to artificial light. My own recollections of the few cases which I had an opportunity of seeing many years ago admit not of my offering any remark on this point: but they are sufficient to confirm my belief, that, although the complaint is in some respects local—is dependent upon the state of the nervous apparatus of the eye in part—yet this local disorder itself depends upon more general or constitutional derangement; and this must especially be the case when the nervous systems and digestive organs are particularly affected, as observed in many cases of this affection. Indeed, very few cases will be found, in which the functions of these systems and organs are not more or less impaired. That the brain is somewhat affected in some instances, is evinced by headach or vertigo, which may, however, equally with the nyctalopia, be symptomatic of impaired organic nervous energy and disorder of the digestive organs. The complaint *continues* for a very various period. It sometimes disappears without the aid of medicine. In temperate climates, it generally assumes a milder form than in hot countries. In the former it usually continues from one month to six or seven weeks. In the latter, it is often prolonged to four, six, or nine months, and even much above that period in some instances.

6. ii. CAUSES.—Nyctalopia is very rarely seen in this country; but in the most southern parts of Europe, and in countries within the tropics, it is not infrequently met with. It is said to be *endemic* in some places within the tropics; and even in some parts of the south of Europe, and of China: it has occasionally also assumed an *epidemic* form even in temperate climates, and in northern countries, where the sun in summer is long above the horizon. Thus, Dr. GUTHRIE observed it very prevalent in the Russian troops in Finland, during the spring, owing to the short absence of the sun, and the strong reflection from the snow. M. RICHERAND states, that nyctolopia is both endemic and epidemic in northern regions from the same causes; and that artisans who exert their sight in an intense artificial light, are occasionally affected with it. Within the tropics, the influence of season in producing this complaint is not so evident as in very cold climates. Dr. J. GRANT remarks that nyctalopia is not infrequent in soldiers and seamen in the East and West Indies; and that on the eastern shores of the Mediterranean, and in the islands of the Adriatic, it is at times very prevalent. It has also sometimes become epidemic in parts of France, Germany, Poland, and Europe. Wherever it occurs, it preserves the same characters, varying only in the severity of its attack and length of its duration, in individual cases, according to the constitution of the patient and the intensity and combination of the causes.

7. Nyctalopia seems to have been congenital in rare instances, according to HALLER and others, or at least to have appeared at a very early age, and to have continued subsequently. It has occurred in three persons in one family; and it has been said to be hereditary in some cases. Europeans residing within the tropics are more liable to it than the native inhabitants; and those who have been attacked are prone to a return of it, if they remain in the same climate. It is very rarely observed in children; and it is more frequent in males than in females. The colour or appearance of the eyes has no influence in favouring its occurrence. It rarely affects the upper classes, but is most frequent in those exposed to fatigue, watching, and debilitating influences, and whose diet is poor or unwholesome. Venereal excesses and manustupratio are also influential causes of it. Nyctalopia has been ascribed also to sleeping in the sun, to poisonous vegetables, and to the use of bread in which darnel is present. The ancients believed the *lolium* to be hurtful to the sight; and the observations and experiments of modern physicians have proved this opinion to be correct. It is not improbable that the *Cannabis Indica*, or Indian hemp, which is so much used in the East for the purposes of excitement and intoxication, has also considerable influence in producing this disease. Its probable dependence in some degree upon exhaustion of nervous power and weakness of the digestive functions, has already been noticed (§ 5.).

8. iii. PATHOLOGICAL STATES.—In most instances, this affection depends upon the over-excitement, and consequent exhaustion, of the nerves of the eye by the brilliant sunshine and light, in warm and arid countries, and in snowy regions, when the light of day is of long continuance, the retina and nerves being thereby reduced to a state incapable of being excited by the feeble light remaining after sunset, and of perceiving objects in that light. In the more extreme cases, the torpor of the retina and nerves seems to be so great as not to be overcome by even a bright artificial light. It is possible also, that the rays of the sun combine with them so much of electro-motive agency as to favour distinct vision, and an artificial light, not possessing this property, is accordingly less influential than they in exciting vision. The same causes, which exhaust the sensibility of the nervous apparatus of the eye, at the same time tend, particularly when energetic and prolonged, to occasion a congested, or a sub-inflammatory, state of the retina, and posterior parts of the organ, and the attendant contraction of the pupil. It is manifest also that all the circumstances which produce exhaustion of nervous energy, particularly many of the remote causes above enumerated, or congestion of the venous circulation, or both nervous exhaustion and vascular congestion, will also favour the develop-

ment of nyctalopia when its more efficient exciting causes are in operation. The connection between impairment of the digestive functions and this affection so very generally observed, is a necessary result of exhaustion of nervous power; for, when the organic nervous energy is much reduced, the functions of sense are readily exhausted and are soon proportionately weakened.

9. iv. THE PROGNOSIS of nyctalopia is generally favourable. As it occurs in temperate or northern climates, it very frequently undergoes a spontaneous cure with change of the season and circumstances in which it originated. Dr. I. GRANT states, that it has occasionally been removed by the occurrence of diarrhœa, of hæmorrhage from the nose, and of abscesses and eruptions about the head and face. I met with a case many years ago which was removed almost immediately by copious discharges of morbid bile consequent upon the exhibition of stomachic purgatives, the inordinate accumulation of bile in the gall bladder and biliary ducts having been intimately connected with the development of this affection. BONTIUS, SENNERTUS, ETTMULLER, BOERHAAVE, and some authors, however, have formed a much more unfavourable opinion of the complaint than that just now expressed; and as it appears in warm climates, particularly when affecting persons addicted to intoxicating liquors, to the use of opium, or of the cannabis indica, nyctalopia is much more difficult to remove, than in other circumstances, and sometimes long resists treatment. Much, however, depends upon the existing states of the nervous system generally, and of the digestive organs, upon the habits of the patient, and upon the continuance or interruption of the exciting causes. In these more unfavourable circumstances, total loss of sight may ensue, as remarked by BAMPFIELD and others; but this result rarely occurs unless internal inflammation of the eye supervenes, or is neglected.

10. v. TREATMENT.—The humoral pathologists, believing that nyctalopia depended upon inspissation and congestion of the humours, had recourse to *bleeding*, *attenuants*, and *deobstruents*, with *purgatives*, *sternutatories*, and *sialogogues*, and as these often removed fæcal accumulations and morbid secretions from the *primæ viæ* and collatitious viscera, advantage frequently resulted from this treatment. In some instances an *emetic* was premised with benefit. The exciting substances, by which the senses of smell and taste were thus roused, sometimes tended, by nervous connections, to remove the torpor of the nerves of the eye. Both the ancients and the moderns, in places the most remote from each other, have had recourse to the livers of various animals — of bullocks, he-goats, sheep, pigeons, black-cocks, black swine, &c.—for the cure of nyctalopia; these being eaten as an article of diet, or the vapour from them being used as a fumigation for the eyes. Dr. I. GRANT states, that he has repeatedly seen a cure apparently produced by fumigating the eyes with the vapour of bullock's liver. The disease occurred in persons who were in some degree affected with scurvy; and various measures had previously been resorted to without benefit; two or three fumigations having cured the complaint. The same writer remarks, that the vapour from the heated liver was applied to the eyes; at other times the viscus itself was given to the patient to eat; in both cases, after it had undergone the most complicated preparations, particularly with various stimulating substances. A recent German writer, Dr. MEISSNER, gives a similar account to the above, of the *liver-cure* of nyctalopia. He states, that, in a small town of Podolia, he met with more than a hundred cases of the complaint. It was then the time of the Greek fast, when the inhabitants use no animal food, but live chiefly on bread and grits prepared with oil. He was assured, that, at the same period every year, a great many people are seized with nyctalopia; but that when Easter came they ate the liver of a black-cock, or black swine, and were cured in a few days. He examined, by day and by night, several of those affected by the disorder, but could perceive nothing particular in their eyes, except great immobility of the pupils. In other respects, they were in perfect health; and would submit to no other treatment, assuring him that they should be free from their malady within fourteen days without any medicines. On Easter day they began to eat liver and animal food, and two of those he had examined saw as well as ever on the third day, and on the following Sunday all were completely cured. In these cases, the application of the heated vapour; the aroma and vapour from various stimulating substances added to the liver; the use of a much more exciting diet, after a protracted fast, which had been more or less influential in producing the affection; the influence of the imagination, and still more probably, the fact of the chief causes of the complaint having ceased to be in operation, serve to explain the effect, without imputing any particular virtue to the particular viscus in question.

11. It is very obvious, that this complaint should be treated upon rational principles, and if the application of these to each case fail in any one, these empirical means may be resorted to, according to the weight of evidence which may exist in its favour. The *first intention* of the physician should be to ascertain the predisposing and exciting causes, and to remove them: — the *second*, to observe the exact states of the eye, and of the head, particularly with reference to the presence of congestion, or of an increased or diminished determination of blood to the brain, eyes, &c., and to prescribe means appropriate to whichever of these states that may be present: — and the *third*, should be to determine the modes in which the several digestive, assimilating, and excreting functions are being performed.

12. The *first* of these requires no remark; but the *second* demands most careful observation of each case, and involves very different, if not opposite, modes of cure, according to the results which each case furnishes to such observation. If vascular plethora, or active congestion of, or determination of blood to, the brain, be present, then depletions, according to the peculiarities of the case, are requisite. If, on the other hand, the vascular system indicate insufficiency of blood, and the state of the head a diminished flow of blood to the brain, a nourishing diet, chalybeate medicines, and tonics, with due attention to the several digestive functions, are thereby indicated. Emetics, stomachic and deobstruent purgatives, alternated with vegetable bitters and tonics: the sulphate of quinine or of iron with camphor: the infusion or decoction, and the compound tincture of cinchona,

are generally beneficial, when employed appropriately to the indications furnished by each case, and ought not to be omitted, even although the indications of internal disorder may be slight. Due regard should be had to the state of nervous power both generally and locally; and whilst torpor of the nerves of the organ should be attacked by the application of stimulants and irritants to the vicinity of the eye, or even to the eye itself, exhaustion of nervous power should be removed by means of the more permanent and diffusive restoratives just mentioned, or by others of a similar nature. With this intention the extract of *nux vomica* or *strychnine*, or the tincture or spirituous extract of *aconite*, may also be severally but cautiously prescribed, either singly or conjoined with vegetable bitters and tonics, or with stomachic aperients.

13. Of the *local means*, blisters applied to the temples, and renewed according to their effects, as advised by Mr. Bampfield, are amongst the most efficacious; but other local stimulants may be prescribed, more particularly the warm vapour of camphor, or of ammonia; embrocations or liniments with ammonia, camphor, tincture of capsicum, are applied on the temples, and warm collyria to the eyes themselves. Besides these, electricity and galvanism have been resorted to, and with more or less benefit. It is not improbable, that an ointment containing either of the most irritant of the narcotic vegetable alkaloids, particularly veratria, strychnine, aconitina, &c., may be of service, when applied to the temples, and the effects carefully watched. Errhines and sialagogues may also be tried.

14. II. Hemeralopia according to the meaning which I have attached to the word (§ 1.), namely, *day-blindness or imperfect vision in the day, particularly in sunshine, and more perfect or natural vision in the twilight*, is rarely observed, even in connection with night-blindness, unless the latter has gone on to inflammation of the inner coats of the eye, or is associated with inflammatory action in the brain, or with incipient opacity in the crystalline lens, or with other diseases of the eye; of which affections some degree of day-blindness is often symptomatic. Indeed, whenever the sensibility of the retina is naturally acute, as in Albinos (probably owing in them to the deficiency of dark colouring matter in this part), or is morbidly increased, owing to disease of more or less intimately related structures, particularly to inflammatory states of the brain, or of its membranes, or to the more temporary excitement consequent upon an excessive use of spirituous or other intoxicating liquors, then more or less of hemeralopia is often complained of, especially in the light of the sun, or in any other strong light. Hemeralopia, like nyctalopia, may be symptomatic also of intestinal worms and even of hysteria. In these circumstances, it may be viewed as a consequence chiefly of a morbid sensibility of the retina and nerves of the eye, and generally independent of inflammatory action.

15. i. *The treatment* of day-blindness must necessarily depend upon the state of disease of which it is symptomatic. If it proceed from inflammatory action, vascular depletions, and the antiphlogistic treatment, cold shower-baths, purgatives, diaphoretics, and sedatives, are generally required, aided by cooling and anodyne collyria. If it proceed from morbidly increased sensibility unconnected with inflammatory irritation, an opposite treatment, as tonics, chalybeates, and restoratives with antispasmodics, anodynes, and anthelmintics are required, with change of air and attention to diet and regimen.

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NOLI ME TANGERE.—See Lupus.

NOSTALGIA.—Synon. *Nostalgia* (from *νοστος*, a return home, and *αλγος*, sorrow), Sauvages, Cullen, and others. *Nostrassia*, *Nostomania*, Auct. var. *Pathopatridalgia*, Zwingler. *Philopatridomania*, Harder. *Maladie du Pays*, *Nostalgie*, Fr. *Das Heimweh*, Germ. *Malattia del paese*, Ital. *Mother-sickness*, *Home-sickness; a morbid longing for home.*

Classif. — General Pathology — Ætiology—Special Pathology.

1. Nostalgia is rather *a cause* of disease than a *disease* in itself. It has, however, been described by several writers as a form of *melancholia*, from which, however, it is quite distinct. I shall briefly consider it *firstly*, as a cause of disease; and *secondly*, as a disease superinducing still more serious disease.

2. I. Ætiology.—If we associate the suggestions or memory of our native home or place with those of many of the attendant occurrences, and the moral emotions and affections of which home has been the scene, what numerous sources of misery or of happiness are often thereby called into existence, more especially if they be made subjects of contemplation or of mental rumination in different, opposite, or less happy circumstances than when they made their first impression on the mind. How frequently is the early happiness of life made the means of heightening present wretchedness, especially by the uncultivated and ill-regulated mind; or by the mind that is unable to repose upon other and more fortifying resources. The suggestions of memory, in continually haunting the mind of him who has removed, for the first time, from the scenes of varied enjoyments and strong excitements, to places remote, not only from these but from all other attachments, particularly if he be doomed to different avocations from those to which he had become accustomed, are amongst the most distressing of the numerous ills that embitter the

destiny of man. They are less, or perhaps but little, felt by him who becomes a voluntary exile in pursuit of gain: but even he has his melancholy reminiscences, "when he would not if he could be gay;" especially after the exciting delusions of hope have lost a portion of their witching influence; and he, at times, with the compelled exile, experiences those emotions which the scenes of early life and of early attachments suggest. The person who leaves his native abode, particularly if it be endeared to him by simple joys and warm affections — if it possess scenery of wild sublimity, or seas of stormy grandeur — if he have been accustomed to gaze upon the one, whilst borne furiously along upon the other — if he have repeatedly escaped from the imminent dangers of either, in order again to experience the exciting pleasures they afford — however far, or in whatever manner removed from such scenes and such enjoyments, he constantly reverts to them, not only in his waking, but also in his sleeping, hours. Visions of former bliss or of former dangers haunt him by night and by day. His sleep is broken or disturbed; his appetite fails him; his healthy looks vanish; and a gradual blight overtakes him. In this manner persons have been known to wither gradually, sometimes without any organ evincing disease of a prominent kind; whilst more frequently some particular part, owing to various concurring causes, experiences dangerous disease, to which this maladie du pays has predisposed, and rendered almost or altogether irremediable. Numerous examples of the effects of continued longing for the scenes of early life occur to the medical practitioner; but they are most common amongst the natives of the high lands, as those of Switzerland and of Scotland, when they migrate to the low countries, where this feeling is heightened by the influence of a more depressing air upon constitutions formed in the pure and cold atmosphere of more elevated regions. Nor are the natives of richer and more fertile countries, and those abounding in peaceful occupations, without an inward pining after the scenes of early enjoyments and tender associations, when removed at a distance from them. Indeed, suggestions of these haunt the minds of the expatriated — whether the willing or the compelled — and, with an attraction of indescribable sweetness, will not allow us to forget our native soil.

> "Nescio qua natale solum dulcedine captos
> Ducit, et immemores non sinit esse sui."

3. Nostalgia is most frequent amongst those who have removed at an early age from the endearments of near and affectionate relatives, and from the simple pleasures of a country life; more especially when disappointment, fatigue, privations, and sickness overtake them soon after their removal. It is common amongst young soldiers and sailors who are subjected to privations and fatigue in foreign climates, particularly if these climates be unwholesome. The endemic influence of these climates, by depressing the vital energies, both favours and increases this desire of return to the place of nativity. CAMPBELL has beautifully illustrated this feeling in the "Soldier's Dream," whilst sleeping on the field of battle, in which the joys and endearments of home appear to him, and sorrow returns to him with waking consciousness. Home-sickness is also frequent amongst young persons of both sexes, who have been unaccustomed to painful impressions, when they remove to large cities, and are subjected to the confinement or rigorous duties of servitude. It is rare amongst persons advanced in years, and particularly amongst those who have experienced the frowns or vicissitudes of fortune. Nostalgia, although more correctly a cause of disease than a disorder of itself, still may be viewed in the latter sense, — as a disorder consisting at first of a morbid exaltation of those instinctive and moral feelings, in which recollections of home and of tender attachments are associated with sentiments of regret at the loss of the endearments which those attachments afforded. These feelings, when inordinately exerted or long indulged, depress, or even further disorder the digestive, assimilating, and circulating functions, through the medium of the organic nervous system, until ultimately disease of the organs performing these functions, or of the brain itself, according to their individual predisposition, is produced.

II. NOSTALGIA, — *Nostomania,* — *Nostrassia,* — *Home-sickness.*

CLASSIF. — I. CLASS. IV. ORDER (*Author*).

4. DEFIN. — *The desire of returning to one's native country immoderately or morbidly indulged, or recollections of home and its endearments made the subject of unavailing regret, to the neglect of other considerations and objects, and to the injury of health.*

5. *A. Symptoms.* — The earliest signs of nostalgia are unusual reserve, sadness, distaste of amusement and of occupation, a continual recurrence to the various circumstances connected with home, and expression of regret at removal, with a desire of returning, and of enjoying those pleasures which the imagination is constantly presenting in more glowing colours than are real. After some time the complexion becomes pale and anxious; the appetite is much impaired; the strength sinks, and the body emaciates. The usual enjoyments of life, and the society of friends or acquaintances, afford no distraction from the constant and painful rumination in which the patient is engaged. As the bodily functions become impaired by the continual indulgence of regret, and of the depressing feelings associated with it, the mind is more and more unable to resist a recurrence to the subject of distress, or to break off the train of painful ideas. The patient nurses his misery, augments it until it destroys his nightly repose and his daily peace, and ultimately devours, with more or less rapidity, his vital organs.

6. In some cases, nostalgia assumes a more acute form and rapid progress — *nostomania* — with cerebral irritation or excitement, presenting inflammatory characters. The ideas connected with home present an unreal form, or a state of exaltation amounting almost to delusion. The head becomes hot; sleep entirely departs; the pulse is accelerated; and headach is complained of; and ultimately somnambulism, or more complete mental derangement, may supervene. After this state has continued for some time or in various grades of excitement or modification of phenomena, more or less complete collapse of the functions of the brain and of the powers of life may take place, and the patient die in the course of a few weeks, as in cases described by M. LARRY. In some instances the patient sinks into a state of marasmus,

with symptoms of low nervous or of hectic fever; and in others the complaint passes into phthisis, disease of the lungs being developed during the continuance of the nostalgia.

7. When nostalgia occurs during the progress of other diseases, the complication renders the state of the patient often very critical; heightening the severity of the primary complaint, and either opposing or entirely preventing convalescence. In these circumstances, indulgence of the hopes of return to the scenes of early happiness becomes necessary to the prevention of fatal results.

8. *B. The Diagnosis* of *real* from *feigned nostalgia* is sometimes required. The former is attended not only by sadness, moroseness, vacuity, or absence of mind and love of solitude, but also by remarkable pallor; by a rapidly progressive emaciation and debility, and by increased heat of the forehead. If accidental mention is made of the place or persons of the patient's attachment, his countenance becomes suddenly animated; his cheeks assume a temporary flush, and his eyes are brilliant.

9. *C. The appearances after death from nostalgia* are stated by M. BEGIN to consist of signs of vascular irritation in the superior and anterior parts of the brain; and more particularly in the pia mater and arachnoid covering them. These signs generally consist of injection of the capillaries of these parts; the effusion of an opaline serum in the meshes of the membranes; slight induration or softening of the cerebral substance; and effusion of serum in the ventricles. These changes are constant; but other viscera also often betray disease, especially the lungs, the digestive canal, and the heart; and, in some cases, one or other of these organs present the chief alterations.

10. *D. Treatment.*—Nostalgia requires more of moral than of medical treatment. Kindness, encouragement, and exciting hopes of soon revisiting the scenes for which the patient longs, are generally of the greatest service. Varied amusement, pleasant occupations, and every means which may distract the mind from the indulgence of feelings of regret, should be resorted to. Music, dancing, gymnastic exercises, theatrical amusement, exercise in the open air, hunting, coursing, &c. may be employed according to circumstances. All allusions which may suggest the subject of the patient's misery should be avoided; but the society of persons from the same place may be encouraged, as the griefs of the patient may be allayed by the encouragements and the happiness of his associates.

11. If indications of cerebral excitement appear, the tepid douche, and subsequently the cold affusion on the head, or the shower bath—and the promotion of the several secretions and excretions —should be recommended. If the above means fail, and when a return to home can be accomplished, this most certain of all remedies should not be neglected. It will succeed even when death is apparently approaching, provided that the lungs have not undergone structural change. In the cases of young soldiers, even a temporary return to their homes, or leave of absence from their corps, has been productive of a salutary influence.

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OBESITY.—SYN. *Obesitas.* Πολυσάρκια (from πόλυ, much, and σάρξ, flesh). *Corpulentia*, Pliny. *Polysarcia*, Sauvages, Vogel, Sagar. *Polysarcia adiposa*, Sauvages, Good. *P. faginosa*, Forestus. *Phænigmus plethoricus; Empymelium polysarcia*, Young. *Obésité, corpulence, embonpoint excessif*, Fr. *Fette, Volleibigheit*, Germ. *Obesita*, Ital. *Obesity, Corpulence, Morbid fatness.*

CLASSIF. — III. CLASS. II. ORDER (*Cullen*).
VI. CLASS. I. ORDER (*Good*). I. CLASS.
IV. ORDER (*Author*).

1. DEFIN. — *An accumulation of fat under the integuments or in the abdomen, or in both situations, to such an amount as to embarrass the several voluntary functions.*

2. I. CHARACTERS. —A certain degree of fatness is quite compatible with health, especially in some persons of the sanguine temperament. Other persons also, as well as these, may be lean or fat, at different epochs of life, without any marked difference in their states of health. As long, however, as their general health is not impaired, and the fatness does not amount to a morbid pitch — to absolute obesity — nor impedes the functions of life and volition, it cannot be viewed as a morbid condition. Obesity may occur at any period of life: it may even, in a slight degree, be congenital. Infants often are remarkably fat whilst they are at the breast; the fat being deposited chiefly under the integuments: but after two or three years of age they become gradually thinner, owing to the exercise they are then enabled to take. Obesity in childhood is often the result of over-feeding and of hereditary predisposition; and in rare instances it continues to increase from infancy through the several periods of childhood. It is unnecessary to adduce remarkable instances of obesity in childhood and early life. Several such cases are noticed by Mr. WADD, M. RAIGE DELORME, and Dr. WILLIAMS. They present no very remarkable phenomena, excepting an unusual degree of muscular strength for that age, the obesity of youth differing in this from the obesity of advanced life.

3. With the progress of age, and as the genital organs are developed, the youthful plumpness of the body is diminished, the activity of these organs increasing all the nutrient and excreting functions, more particularly in males. The absence of the testes in eunuchs, and indeed castration of any of the lower animals, has a remarkable influence in favouring obesity. As age advances, especially after the forty-fifth or fiftieth year, when the genital organs lose much of their activity, the tendency to an inordinate accumulation of fat in the œconomy is most remarkably evinced; although various circumstances, as impairment of general tone and vigour, confinement, and want of exercise, the states of the locality and climate, may hasten it, and opposite circumstances delay or prevent it. After the fortieth year, the indulgencies of the appetite for food are more frequent, and active physical exertion is either diminished or in a great measure laid aside. Many of the active pleasures of early life are then, or soon

afterwards, superseded by other duties or by the sedentary occupations of life; whilst in females, the peculiar functions they have to discharge, the changes to which they are liable with the advance of age, and the various changes contingent on child-bearing and suckling, tend remarkably to produce obesity.

4. The *situations* in which fat is most liable to accumulate to an inordinate amount are in the subcutaneous tissue, in the interstices between the muscles, in the omentum and mesentery, under the pericardium, around and under the kidneys, in the mediastinum, and around the mammary glands. In cases of the more *sthenic forms* of obesity (§ 9.), the deposition of fat is *general*, or presents a certain relative proportion in these and other places where it usually accumulates; and, unless the accumulation is excessive, the functions of the body, excepting those of volition, are not materially impeded. But when obesity becomes truly great even in these, and still more remarkably in the *asthenic* form, and in more cachectic or leucophlegmatic habits, volition, respiration, and circulation are remarkably embarrassed, especially upon attempts at physical exertion, and upon mental emotion: the digestive, assimilating, and excreting functions being both primarily and consecutively impaired.

5. In many cases, particularly of morbid accumulations of fat, the obesity is *partial*. This is most frequently observed in the omentum, giving the appearance termed a pot-belly, in the mammæ, neck, in the abdominal parietes and nates, or haunches of females, and around the kidneys. In a very remarkable case of fatness in a female between fifty and sixty years of age, and in which death occurred from internal strangulation of the intestines, under the care of Mr. Jones and the Author, remarkable collections of fat into bag-like masses or tumours were observed to be attached to, or rather to hang down from each axilla; the fat under the abdominal parietes being about six inches deep. Instances of partial fatness of a strictly morbid kind are met with also in other situations. The most remarkable, and at the same time the most dangerous, of these, is the accumulation of fat in the parietes of the heart, where it occasions atrophy, softening, pallidity, and weakness of the muscular fibres, favouring passive dilatation and even rupture of the cavities. (See Art. Heart, § 227. *et seq.*)

6. The *amount* of obesity varies remarkably; and it is often difficult to draw a line between the fatness consistent with health, and that which may be viewed as morbid. The transition from the one to the other is gradual, and the progress to the latter, as well as its more unequivocal existence, is characterised by impaired vital energy and tone, as manifested particularly by the digestive and assimilating functions. The fat usually found in the healthy body has been estimated at various amounts, from one-tenth to one-fifteenth of the weight of the body. In extreme cases of obesity, the fat may constitute two-thirds or four-fifths of the entire weight. Mr. Lambert weighed 52 stone 11 lbs.; and in his case, probably the proportion of fat to the other parts of the body was even greater than that just assigned.

7. In the medical consideration of obesity it is requisite to view the accumulation of fat as merely a part—a part more or less prominent—of functional disorder, and even sometimes of more serious and extensive disease. The external and physical characters which the obesity presents, and the various phenomena and functional aberrations with which it is associated, will generally indicate, not only its pathological sources, but also its probable consequences; and point out the kind and extent of professional interference, and of personal management it may require, as either an incipient, an advanced, or even an almost irremediable constitutional mischief.

8. There are several points to which attention should be directed, in estimating the character, tendencies, and probable consequences of obesity, as furnishing the basis of a rational treatment of it. These are the evidences furnished of the *states of vital power* as manifested chiefly in the digestive, assimilating, and excreting functions; of the conditions of the respiratory and circulating organs, and of the blood; of the muscular structures and actions, and of the general surface and appearance. The pathological conditions and tendencies of a case are indicated by them; and in proportion as these are impaired, so is the health deteriorated, whatever may be the amount of obesity. According to the states of these functions and organs, obesity has been divided into *sthenic* and *asthenic*, the transition from the extreme of the former to the extreme of the latter being gradual and presenting no break.

9. *a.* When the organic or strictly vital functions are not materially impaired; when the respiratory and circulating actions proceed without material disorder, unless upon physical exertions which obesity may embarrass or impede; when the blood is not apparently deficient in quantity or quality; when the muscles are not emaciated nor deficient in firmness or power; and when the countenance and general surface retain their usual appearances or a healthy hue, the *sthenic character* is present; and in proportion as these evidences are furnished, in like proportion this state of vital manifestation exists. It is of the utmost importance, as respects not only obesity itself, but also the treatment of diseases which occur in fat persons, that the states of vital power, and of the circulation, particularly as regards the quantity of the blood, should be correctly estimated.

10. *b.* In proportion to the departure from these states of healthy function, — as the vital powers become impaired; the respiration short, puffing, or asthmatic; the circulation embarrassed, the blood deficient, watery, or dark; as the muscles are weak, flabby, or emaciated, and the fatty accumulations soft or leucophlegmatic; and as the countenance becomes bloated, the surface sallow or of an unhealthy hue,— so obesity, however great it may be, should be viewed as being *asthenic*, and more especially morbid, as regards its existence and its consecutive states. In this form of obesity, intercurrent visceral or internal disease often pursues a rapid and unfavourable course; and the inexperienced practitioner, misled by the fatness and apparent vascular fulness of the patient, is often induced to take away a part of the already deficient blood. I have on several occasions met with such occurrences, the remarkable deficiency of blood being evinced, on dissection after death, by the blanched state of the viscera and structures. In all cases of asthenic obesity, lowering or depletory measures are not well endured, even in the treatment of acute diseases affecting subjects thus circumstanced; or, if at all adopted, they

should be aided by derivative and restorative means.

11. II. CAUSES.—The *causes of obesity* are chiefly *predisposing*, for, unless the predisposition be strong, the *exciting causes* are generally inoperative. — *a.* The *predisposing causes* are, chiefly, a peculiar diathesis, temperament, or habit of body *hereditarily* transmitted; inactivity, indolence, and quietude of body and mind; a lively, happy, and sanguine disposition; sedentary occupations, and a heavy or insufficiently pure or renewed air. Where the hereditary predisposition is strong, moderation in both food and drink will not prevent obesity, unless very active exercise be taken, or even great or continued exertions may be made, in the open air; and where no such predisposition exists, large quantities of food and drink may be taken without any change from a state of leanness. The constitutional predisposition to obesity varies much in its character, with the state of the powers of life, and with the conformation of the frame. Persons of strong conformation, of the sanguine temperament, and of good health, if fully and richly fed — if they partake of much oily and carneous food, and of malt or vinous liquors — often become fat, although they take much exercise, especially when they advance in age, or live in the close air of towns; and if these persons, after having had the advantage of active exercise in the open air in early life, are obliged to forego this advantage, and are devoted to sedentary occupations, obesity sooner or later overtakes them — sometimes with great rapidity, if they live thus fully and richly. But in them obesity generally presents more or less of the *sthenic* character, unless their general health has been previously injured, or their confinement to an insufficiently renewed air has been close or prolonged. Others, who take considerable exercise, enjoy good health, and eat heartily of nutritious food, become fat, although not in remarkable excess; and in them obesity always presents the sthenic character.

12. In persons of a weak or lax fibre, of a leucophlegmatic temperament, and weak vital or constitutional powers, obesity is frequently hereditary; and is apt to occur, even without this predisposition, if they enjoy in abundance the necessaries and luxuries of life; but it always assumes an *asthenic* or atonic form. In these, the appetite is generally much greater than the powers of complete digestion and assimilation; the pulse is soft, languid, and weak, and the excretions are scanty. Obesity often occurs in those who have been weakened by excesses, by long confinement in a close atmosphere, or by disease, and is frequent in the advanced periods of life, and in those of a cachectic habit of body. It occasionally is consequent upon torpor and chronic disease of the liver, and upon protracted dyspepsia; and in some instances it is attendant upon scanty menstruation, partial anæmia, and slight chlorosis in young females. In these cases more particularly, the muscles are pale, flabby, and wasted, in proportion to the accumulation of fat, which is soft, flabby, or semifluid.

13. *b.* The *more immediate or exciting causes* of obesity are sufficiently obvious; — is generally a full and rich diet and a life of ease, — the partaking of food and liquors beyond what is requisite for the waste and wants of the economy, for the amount of exercise which is taken. Soldiers and sailors do not become obese during a campaign; but change their duties, give them plenty of rest, or make them landlords of inns, butlers, butchers, &c., and more than one half of them would soon be corpulent. It is the *quantity* more probably than the *quality* of the food which fattens; still many substances, particularly such as are oily and saccharine, promote obesity more remarkably than others. Fat meats, butter, oily vegetable substances, milk, saccharine and farinaceous substances, are the most fattening articles of food: whilst malt-liquors, particularly rich and sweet ale, are of all beverages the most conducive to the same end. The fattening effect of figs and grapes, and of the sugar-cane, upon the natives of the countries where these are abundant, are well known. In various countries in Africa and the East, where obesity is much admired in females, warm baths, indolence, and living upon saccharine and farinaceous articles, upon dates, the nuts from which palm oil is obtained, and upon various oily seeds, are the means usually employed to produce this effect. Amongst the Asiatics, farinaceous articles, sugar, sweetmeats, milk, butter, and vegetable oils, are chiefly indulged in with this object.

14. Many years ago I was consulted by a lady who, at the early age of about thirty-six years, had become excessively corpulent: and the circumstance of her having diminished the quantity of her food to the utmost extent, her obesity still increasing notwithstanding, had rendered her more anxious respecting it. After various inquiries respecting her modes of living, it appeared that she partook of very little of the usual articles of food, and of none of the fermented or distilled beverages, but she ate very large quantities of white sugar, to which she had taken a great liking. The cause was now obvious, as was the cure. The influence of malt-liquors, particularly such as abound most in saccharine matter, is very manifest. Instances in proof of this influence, calculated more to amuse than to instruct, have been adduced by WADD and others.

15. Rest, indolence, ease of mind and body, too much sleep, sleeping after a full meal, too much food, and indulgence in any kind of vinous, spirituous, or malt liquor, are the chief causes of obesity; the predisposing and constitutional causes (§ 11.), imparting to it the distinctive characters of *sthenic* and *asthenic* above assigned to it.

16. III. PATHOLOGY.—I have briefly stated the nature of obesity in the article on the pathology of the ADIPOSE TISSUE, (§ 3.); and my views, there exhibited, are in accordance with those since published by LIEBIG, in some respects, but different from them in others, as he imputes too much to chemical affinities or actions, and keeps out of view the controlling influence of vitality. The abnormal condition, according to LIEBIG, which occasions the deposit of fat in the animal body depends upon a disproportion between the quantity of carbon in the food, and that of oxygen absorbed by the skin and lungs. In the normal condition, the quantity of carbon given out is exactly equal to that which is taken in with the food, and the body acquires no increase of weight from the accumulation of substances containing much carbon and no nitrogen. If we increase the supply of highly carbonised food, then the normal state can be preserved only on the condition that by exercise and labour the waste of the

body is increased, and the supply of oxygen augmented in the same proportion. The production of fat is always a consequence of a deficient supply of oxygen, for oxygen is absolutely indispensable for the dissipation of the excess of carbon in the food. LIEBIG further argues that, since in all fatty bodies there are contained, on an average, only 10 equivalents of oxygen for 120 equiv. of carbon, and since the carbon of the fatty constituents of the animal body is derived from the food, seeing that there is no other source whence it can be derived, it is obvious, if we suppose fat to be formed from albumen, fibrine, and caseine, that, for every 120 equivalents of carbon deposited as fat, 26 equivalents of oxygen must be separated from the elements of these substances; and further, if we conceive fat to be formed from starch, sugar, or sugar of milk, that for the same amount of carbon there must be separated, 90, 104, and 110, equivalents of oxygen from these compounds respectively. There is, therefore, but one way in which the formation of fat in the animal body is possible, and that is, a separation of oxygen from the elements of the food. Thus he infers that the surplus of oxygen, or the oxygen disengaged during the conversion of food into fat, goes to the support of respiration, and to supply, in part, the oxygen which is too sparingly furnished by respiration.

17. There may be much truth in these views — they are probably true in part — but LIEBIG does not sufficiently estimate the influence of the vital power in producing and controlling the combinations of the animal elements, whilst these elements and their combinations are within the sphere of this influence. The various changes which the food undergoes from the moment of its mastication, are produced by this influence, aided by the secretions poured into the alimentary canal, in the first instances, and by the oxygen of the atmosphere subsequently, when the product of digestion is conveyed into the circulating system.

18. But LIEBIG states, that "the most decisive experiments of physiologists have shown, that the process of chymification is independent of the vital force; that it takes place in virtue of a purely chemical action, exactly similar to those processes of decomposition or transformation which are known as putrefaction, fermentation, or decay." Now we have here to take M. LIEBIG's word for the decisiveness of the experiments to which he refers; for he has neither adduced, nor referred to, any of them. The fact is, that these experiments prove the converse of his proposition; and common sense and observation prove it still more strongly, for we have, from all these sources, every reason to infer that the quantity, and probably also the quality of the gastric juice are influenced by the states of vital and organic nervous power. That the action of the gastric juice upon the masticated food is identical, neither with fermentation, nor with putrefaction, nor with decay, is most probable; that it is somewhat similar to each or to all may be admitted; but that it is purely chemical, as inferred by LIEBIG, requires further proof. That the gastric juice exerts a certain degree of action when it is removed from the system is no proof that this action is either purely chemical, or entirely independent of vital influence; for it is sufficiently shown, that all the recrementitious secretions possess a certain emanation or endowment of vitality, which is soon dissipated; and as soon as it is dissipated, decomposition supervenes. That a transformation takes place in consequence of the admixture of the gastric juice with the food is all that we know; that this transformation may be fermentive, or putrefactive, or chemical, as respects certain of its aspects, may be admitted; but that it is neither the one nor the other altogether, that it is peculiar in many respects, and that it is influenced by the states of vital and organic nervous power, are sufficiently manifest on a comprehensive view of the subject. That the gastric juice acts to a certain extent upon food enclosed in perforated balls, or even when entirely removed from the stomach, so as even to give the food the appearance of chyme may even be conceded; but that the change is complete, or altogether such as it would have been if it had been subjected to the vital influence of the stomach and duodenum, in the natural process of digestion, is not proved.

19. IV. TREATMENT. — The indications and means of cure are, in many cases, very obvious and easily prescribed; but they are rarely even partially adopted, and still more rarely adopted in all their parts, by the patient. *Temperance* in eating and drinking, and *active exercise* in the open air, — the avoidance of the chief causes of obesity — are easily insisted on; and proofs of the efficacy of the recommendation are sufficiently strong. But the patient, however well he may be convinced of the propriety of this advice, has seldom strength of resolution to adopt it, particularly as respects the curtailment of those pleasures furnished by the palate, the indulgence of which become only the more inveterate as we advance in age, and which are the last of the sensual gratifications which are relinquished.

20. *A*. In the more *sthenic forms* of obesity, all articles abounding in fat or oil should be relinquished, and lean and white meats, the lighter kinds of fish, brown or rye bread, turnips, greens, and others of the less nutritious vegetables, ought to constitute the chief diet; and even these should be taken in moderation. Active exercise, particularly on foot, or on a rough trotting horse, gymnastic amusements and exercises, and the shower or cold bath, followed by active frictions of the limbs and trunk by the patient himself, are also most important parts of the treatment. Early rising and exercise before breakfast; and a moderate indulgence in sleep, avoiding it after dinner or during the day, ought also to be enforced. The treatment of this form of the complaint is altogether *regimenal*, little or no medicine being requisite, beyond what may be necessary to preserve the secretions and excretions free, or to control injurious local determination of blood, as it may occur. It has, however, been recommended to impair the appetite by giving the patient nauseating doses of antimony, of squills, or of ipecacuanha. The last of these is the safest, and it only should be employed, if a recourse to this indication be determined upon. But it is much safer to trust altogether to temperance and exercise than to other means which may be productive of disorder. If the appetite be painfully craving in the intervals between meals, the patient may take a camphor lozenge or chew a small piece of camphor with advantage; but smoking cigars or tobacco of any kind, although often efficacious, is ultimately injurious to the digestive

functions and nervous system. It is preferable to endure hunger for a time; after some days this sensation will become less urgent, and abstinence be more easily tolerated.

21. A recourse to acids, whether mineral or vegetable, in order to reduce or to prevent obesity is generally injurious, especially if persisted in for a period sufficiently long to produce this effect, and is apt, not only to injure the digestive organs, but also to favour the occurrence of disorders of the urinary organs, and of rheumatic and gouty affections. The employment of soap and alkalies, as advised by Dr. FLEMYNG, is, upon the whole, safer than the use of acids, particularly in the gouty and rheumatic diatheses. But the prolonged use even of these, is liable to induce chronic disorders of the kidneys and bladder.

22. *B.* The treatment of *asthenic obesity* should depend mainly upon the disorders of the digestive and assimilating organs with which it is often associated and as often the result. In females, this form of obesity is frequently complicated with disorder of the uterine organs, and hence attention ought to be paid to this circumstance. In this state of the complaint, also, temperance and exercise in the open air are the most important parts of the treatment. When the liver is torpid, the nitro-muriatic acids may be prescribed, or PLUMMER's pill with soap, the bowels being duly regulated by means of stomachic aperients or purgatives. The same means may be employed if the liver should be inferred to be enlarged or obstructed, or the iodide of potassium may be taken with liquor potassæ, and the compound decoction of sarza. In some cases, the preparations of iron may be given, particularly the tincture of the sesquichloride, or the alkaline preparations of iron. In most instances of asthenic obesity, change of air, travelling, and a course of mineral waters suited to the peculiarities of the case, as the alkaline, the chalybeate or the saline, as circumstances may require, should be recommended, and aided by suitable diet and regimen.

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ŒDEMA. — SYN. Οιδημα (from *οιδεω*, I swell), Dioscorides. *Œdema*, Sauvages, Vogel, Sagar, &c. *Leucophlegmatia*, Plater. *Ecphymu œdematicum*, Young. *Œdème*, *Œdématie*, *Enflure*, Fr. *Geschwulst*, *Wassergeschwulst*, Germ. *Edema*, Ital. *Puffing*, *watery swelling*, &c.

CLASSIF.—IV. CLASS. IV. ORDER (*Author*).

1. DEFIN. — *A swelling occasioned by the effusion or infiltration of water or serum in cellular structures.*

2. Although the sub-cutaneous cellular tissue is most frequent, it is not the only, seat of œdema. Slight effusion of serum is also occasionally observed in the sub-mucous and sub-serous cellular tissue, and in the cellular parenchyma of the viscera. Œdema of the *sub-mucous* or *sub-serous cellular tissue* seldom gives rise to symptoms of sufficient importance to point out the nature of the lesion. Œdema, however, of certain of the most important organs may be recognised during the life of the patient, especially *œdema of the glottis* (see art. LARYNX, § 67.), and *œdema of the* LUNGS (see art. LUNGS, § 166.). *Œdema of the brain* is not so readily recognised, and is of much rarer occurrence than that of the lungs; and is chiefly observed in the insane, particularly in the subjects of general insanity, in its more chronic and apathetic states. In whichever situation œdema may occur, it presents either a *passive* or an *active* character.

3. *A. Passive œdema* — *the cold œdema* of some authors — proceeds from the retardation or suspension of the circulation either of the veins or of the absorbents, or from impaired or impeded action of the heart, and consequent interruption of the venous circulation. — *a.* It may arise from obstruction or obliteration of one or more veins; from a varicose state of the veins; from preserving for too long a period the same position, the physical overcoming the vital influence, as in standing for a long period; from a weak action of the heart; from want of action of the muscles, whereby the venous circulation is unaided, as observed in cases of palsy, which is often attended by œdema; from a thin watery or morbid state of the blood, often connected with deficient tone of the organic nervous system, as in chlorosis, scurvy, &c.; or from the superabundance of water in the blood, as in granular and other diseases of the kidneys, and in suppression of the cutaneous perspiration.

4. *b.* On *examination after death*, the volume of the part is found increased by the exhalation of serum in the meshes of the cellular tissue. The surface of the swollen part is generally pale; and, upon incising the part, the serum escapes in a fluid state; but sometimes, particularly when the serum is albuminous, it is retained in the cellular meshes, and presents a gelatinous appearance. The same characters are observed in all cases of passive œdema of the cellular, sub-cutaneous, sub-mucous, and sub-serous cellular tissues. Passive œdema of parenchymatous organs increases the bulk of these organs; but in other respects presents the same appearances as those just mentioned. The structure of the œdematous organ is sometimes a little discoloured, and when firmly pressed by the finger it retains the impression, as observed in œdema of the sub-cutaneous cellular tissue. When incised, the divided surface permits the escape of the effused serum in drops; but when the serum is pressed out, the parenchyma of the organ presents no further lesion than rarefaction by the evacuated fluid.

5. *c.* The *symptoms of passive* or *cold œdema* readily distinguish it from *active*, or *warm œdema* (§ 6.). The pallor and coldness of the surface, the depression following the pressure of the finger,

the state of the pulse, and the absence of febrile action, are sufficient to point out the passive form of this lesion. The *nature* of the obstruction causing the œdema is sometimes indicated by the appearances presented by the œdematous part: thus, when the obstruction is in the veins in the vicinity of the part, the superficial veins are often distended. When the obstruction is remote or central, or when the œdema is produced by the state of organic nervous power, or of the blood, this condition of the superficial veins is not observed; and the surface is generally pale. The *seat* of the œdema also often points out the obstruction occasioning it: thus œdema of the face, commencing generally in the eye-lids, is commonly caused by obstruction to the circulation through the heart, particularly its left side, and is frequently consequent upon hydrothorax caused by this lesion; and upon congestive inflammation of both lungs. Œdema of the lower extremities most commonly follows obstruction in the right side of the heart. Œdema of the upper extremities generally precedes that of the lower, in cases of hydrothorax; and sometimes œdema occurs in the side of the face, and in the hand corresponding with the side of the chest in which the effusion exists, when one cavity only is the seat of effusion. Œdema of the face and of the extremities may occur equally, or about the same time, in disease of the kidneys, with superabundance of serum in the blood, or with other alterations of this fluid. Œdema of the lower extremities may proceed from the pressure of the gravid uterus, or of pelvic tumours, or of accumulated fæces in the cæcum or colon, or of enlargement of an undescended testes (*Author*), or of enlarged glands, and from disease of the veins or absorbents, as well as from obstruction in the right side of the heart. Œdema of the male genitals proceeds from the same lesions as occasion œdema of the lower extremities; but it may also arise from strangulation by the prepuce, or from urinous infiltration. Œdema of the female genitals is usually caused by pregnancy.

6. *B. Active, or warm œdema,* is not so frequent as the former variety.—*a.* It is sometimes connected with inflammatory action in the part, or in the vicinity, especially with *asthenic* inflammation, or that weak state of inflammatory action which occurs in weak, cachectic, or leucophlegmatic persons, or lymphatic constitutions, and which has been termed by some *hydro-phlegmasia.* It attends, in a more or less remarkable form, certain states of Erysipelas — the *œdematous* especially — and diffusive inflammation of the cellular tissue. It is, in every respect, a state or form of inflammation of the cellular tissue. The surface is not only swollen, but is also warm and generally coloured, sometimes with various shades of deepness. It is often somewhat firmer to the touch, and does not pit from pressure so readily as in the passive form.

7. *b. Upon dividing the œdematous part,* the effused fluid is frequently different from that found in the passive variety. It is often sero-puriform; occasionally the serum is sanguineous, sanious, or sanguineo-puriform. It is also sometimes purely serous, of a yellowish tint. The predominance of either serous or puriform characters differs much in different cases. The same appearances are often observed in the vicinity of inflammation of parenchymatous organs, as in œdema of the lungs occurring in the vicinity of inflamed parts of the organ.

8. *b.* The *diagnosis* of active œdema is easy. The increased temperature of the part, the occasional redness of the surface, and pain or tenderness from pressure, the state of the circulation, and the general febrile commotion, sufficiently distinguish active from passive œdema. The former usually appears more suddenly, and proceeds more rapidly, than the latter; and is often consequent upon deep-seated suppuration, or upon the presence of irritating matters in the circulation. In this latter case, the fluid effused is generally of an irritating and contaminating nature, inducing unhealthy suppuration, or sloughing, of the cellular tissue in which it is effused, or through which it extends.

9. *c.* The *prognosis* is important in respect both of the constitutional and of the local relations of œdema. In the passive form, the œdema indicates a most serious, and even dangerous, condition of the circulating system, or of the kidneys. In the active state, the danger may not be so great, particularly when the œdema is associated with inflammation in its vicinity: but even then, it should suggest the presence of inflammation of either the veins or absorbents, or even of both, or at least pressure upon, or interrupted circulation through, the trunks of veins. When œdema is connected with a morbid state of the circulation, with irritative fever, or is symptomatic of deep-seated suppuration, &c. (§ 8.), it should be always viewed as indicating great danger, if not increasing it.

10. *d. Treatment.* It is unnecessary to enter more fully into the treatment of œdema than to remark, that the means of cure should be directed to the pathological condition or cause of which œdema is merely a symptom; and that the principles and means of cure which have been advised for *anasarca* (see art. Dropsy, § 132. *et seq.*) should be employed for it. When the œdema is consequent upon deep-seated suppuration or is erysipelatous, then the constitutional and local means prescribed for the œdematous and gangrenous states of Erysipelas (see that art.), or for diffusive inflammation of the Cellular tissue (§ 35.), or for Asthenic inflammation (§ 236.), are the most appropriate; the various physical or mechanical causes which may operate in particular cases being removed.

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ŒSOPHAGUS, DISEASES OF THE — *Œsophagus* (from *οιω*, *οιζω*, fut. *οισω*, I carry, and *φάγω*, *φαγος*, I eat, &c.). *Œsophage*, Fr. *Die Speiseröhre, der Speisenträger*, Germ. — There are two portions of the alimentary canal, the diseases of which have been very generally overlooked by systematic and practical writers in this country, and which have received but an imperfect notice from foreign authors. I allude to the *œsophagus* and *cæcum*. The former is perhaps less frequently diseased than any part of the canal; the latter is, as I have shown in the article CÆCUM, one of the most liable of the organs of the body to functional disorder and organic change. Through the one, the passage of the ingesta is rapid, and on it their effects are slight or transient, unless when they are of a most irritating and noxious kind: through the other the passage of alimentary and fæcal matters is remarkably slow and liable to interruptions, and hence injurious impressions are made on the containing parts by morbid or irritating states of the contained substances, and hence, probably, is partly owing the less frequency of diseases of the *œsophagus* compared with those of *cæcum.* Still the diseases of the œsophagus are much more common than have been supposed; the little attention which has been paid to them having been the cause of their being overlooked in many cases in which they were actually present. And when we consider the frequency of diseases of the pharynx and throat on the one hand, and of diseases of the stomach on the other, we can hardly infer that the œsophagus should escape participating in them so generally as has been supposed.

2. In discussing the diseases of the œsophagus I shall *firstly* give a rapid sketch of the *structural changes* which this canal occasionally undergoes in the course of diseases in which it is implicated; and I shall next consider, in succession, the most *important of the maladies* which occasion these changes, with the *consequences* which they usually produce, the *symptoms* by which they are indicated, and the *treatment* they require.

I. STRUCTURAL CHANGES OF THE ŒSOPHAGUS.

CLASSIF. — IV. CLASS, I. ORDER (*Author*).

3. The œsophagus presents organic lesions less frequently than the mouth and pharynx, and still less so than the lower parts of the digestive canal. — *a.* The *epithelium* covering its mucous surface is sometimes eroded, softened, or even destroyed, at its inferior part. This is often met with in children at the period of weaning, and in those who have been imperfectly or improperly nourished. M. ANDRAL has found the epithelium remarkably thickened.

4. *b.* The *mucous membrane* of the œsophagus is but seldom inflamed or congested with blood compared with other parts of the digestive canal, unless consecutively upon eruptive diseases, particularly scarlatina. It is generally injected or congested with black blood in rabies, especially its upper portion. It is sometimes *thickened* either generally or in parts. Its *follicles* are occasionally enlarged and apparently congested and obstructed, particularly in young subjects and in mucous or gastric fevers. *Vegetations* or *excrescences*, of various sizes and forms, have been found to shoot from it, narrowing the passage and most seriously obstructing deglutition. Cases of this description are mentioned by SCHNEIDER (in HALLER's *Collect. Dissert.* viii. No. 258.), DALLAS and MONRO (*Edin. Essays and Observ.*, v. iii.), and BAILLIE. *Ulcers* are, perhaps, less frequently observed in this part of the digestive tube than in any other. I have, however, met with several cases of this lesion, which is not infrequent in children. Ulcers in this situation have been described and delineated by SANDIFORT (*Museum Anatomicum*, tab. civ. fig. 3.) and BAILLIE (*Series of Engravings, &c.*, fasc. iii. pl. 3. and 4.); but notwithstanding that BRUNNER had described ulceration of the œsophagus as commencing in its mucous follicles, this form of ulceration has been overlooked by those pathologists. I shall, therefore, notice this lesion more fully in the sequel. *Agglutination* of the opposite parietes of the œsophagus, by coagulable lymph thrown out upon its mucous coat, has been said to have been found in a fatal case of small-pox (BARTHOLINUS, *in Act. Hafn.*, t. i. obs. 109). This is, however, an extremely rare occurrence. Exudations of lymph, forming a false membrane upon the mucous surface of the canal, is not rare, and is found generally in the upper part of it, in cases where this exudation is thrown out over the tonsils and pharynx (see §. 23.).

5. *c.* The *sub-mucous cellular tissue* of the canal is sometimes inflamed or congested, in the same circumstances as those just mentioned: infiltrations of serous, sero-puriform, or sanious fluids are also observed in it as consequences of inflammation. It may also become *thickened* and *indurated*, particularly after protracted inflammatory irritation. It may be transformed into a *fibro-cartilaginous* substance, or into *scirrhous* structure, thereby narrowing, even nearly to complete obliteration of, the tube. Instances of *scirrhous degeneration* of the tube, passing into the ulcerative or *carcinomatous state* are not rare, especially in the extremities of it; but simple thickening and induration caused by chronic inflammation have often been mistaken for scirrhus. Transformation of a portion of the tube into a *cartilaginous state* has been observed by MORGAGNI, HAASE, and others. This canal may be partially or entirely obstructed also by *abscesses* formed in its parietes or even exterior to them; or by the growth of *tumours* in its vicinity: thus slowly increasing difficulty of swallowing attends upon aneurism of the aorta, or upon a mass of obstructed lymphatic glands pressing upon the œsophagus. BLEULAND has seen this effect produced by exostosis of the body of a vertebra. The dysphagia, however, which proceeds from these causes is seldom so urgent or distressing as that which depends upon disease of the coats of the tube.

6. *d. Softening* and *attenuation* of the œsophagus are occasionally met with, and these states may even go on to spontaneous perforation, presenting all the anatomical characters which this lesion evinces in the stomach. — *Gangrene* of the tube is very rare. I agree with M. ANDRAL in considering the majority of cases of this occurrence recorded by authors as pulpy softening of the part, which is not uncommon in infants and children. It, however, sometimes occurs, especially near the pharynx in malignant scarlet fever.

7. *e. Perforation* of the œsophagus generally is followed by effusion into the thorax. M. ANDRAL states that the perforation in all the recorded cases has taken place in the thoracic portion of the canal near the cardiac orifice; and the surrounding part of the parietes has sometimes been found altered and softened, and at other times without any appreciable alteration. There are, however, cases on record in which the perforation had taken place about the middle and upper part of the tube. The perforation in a case attended by me was above the middle of it; and similar instances are published by KADE (*De Morbis Ventriculi*, &c. Halæ, 1798.), and by REIL (*Memorab*,

Clin., fasc. i. p. 13.), who met with it in cases of typhus fever.

8. Perforation of the œsophagus occurs at all ages. M. VERON met with it in an infant just born. M. GUERSENT observed it in a child of seven years of age. M. BOUILLAUD found it in an adult, in whose stomach four perforations also existed. I have seen it in a child. It occurs more frequently at the periods of infancy and childhood than at any other. In some cases, the perforation is stopped by the aorta or trachea, so that no effusion takes place. In other cases, a double perforation occurs, and the canal of the œsophagus communicates with that of the trachea or even of the aorta. Instances of the communication of the œsophagus with the trachea in this manner have occurred to ZEVIANI (*Memorie de Fisica di Verona*, t. vii.), MONRO (*Morb. Anat. of the Gullet*, &c., 8vo. 1830, p. 373.), and to myself. In the majority of cases of perforation, the ulceration appears to commence in one of the follicles (see § 37.).

9. *f. Purulent* and *tubercular* matters have sometimes been found underneath the mucous membrane of the œsophagus. *Albuminous exudations* also form either in patches, or to such an extent as to form false membranes, as already noticed (§§ 4. 23.). M. GURI found a layer of whitish firm matter adhering closely to the mucous surface in a new-born infant; and HILDENBRAND states that its formation is not infrequent, but that it generally separates and passes into the stomach, being rarely excreted upwards. This agrees with what I have observed in some cases of epidemic croup and scarlet fever.

10. *g. Dilatation* of the gullet seldom occurs unless, as remarked by PORTAL (*Anat. Med.* t. v. p. 204.), from stricture of the cardia and of parts of the tube below the dilatation. In some cases the dilated part forms a large sac, a portion of which falls lower than the seat of stricture, constituting a kind of diverticulum. Cases of this description have been noticed by ISENFLAMM and SANDIFORT (*Med. Anat.* t. i. p. 242.).

11. *h. Polypous excrescences* have been found shooting from the internal surface of the gullet, narrowing the passage and obstructing deglutition; but they occur less frequently in this situation than in the pharynx. They present the same appearances as in other situations, and have been noticed by PRINGLE, MONRO (*Edin. Essays and Observ.*, vol. iii.), BAILLIE, GRAEFFE, and SCHNEIDER (see HALLER's *Coll. Dissert.*, vii. No. 258.). They often grow from a pedicle sufficiently long to permit of their rising into the pharynx upon efforts to vomit.

12. *i. Cartilaginous* and *osseous* degeneration of the œsophagus are observed in rare instances and generally confined to a small portion of the tube, forming a kind of ring. GYSER (*De Fame Lethali ex Calloso Œsophagi Angustia*, 4to, Argent. 1770.) found a cartilaginous ring, stricturing the canal so as to prevent the passage of a sound. Similar cases have been recorded by BECKER, BANG, BALDINGER, ANDRAL (*Anat. Pathol.* t. i. p. 276.) and others. Cartilaginous degeneration of the gullet in its whole extent has been said to have occurred to SAMPSON (*Miscell. Curios.* &c. Ann. 1613.), GARNIA (MORGAGNI, *De Sed. et Caus. Morb.* epist. xxviii. 15.), and DESGRANGES (*Journ. de* BOYER *et* CORVISART, &c. t. iv. p. 203.). *Osseous* and *cretaceous deposits* are also very rarely met with in the parietes of the gullet. Instances, however, have occurred to the elder MONRO, ABRAHAMSON (in MECKEL's *Archiv.* b. i. st. iii. p. 16.), and to WALTHER (*Mus. Anat.* b. i. No. 278.).

13. *k. Rupture* of the œsophagus has been very rarely observed. Instances of its occurrence after vomiting and muscular efforts have been published by BOERHAAVE, ZEISNER (*Disser. de Raro Œsophagi Morbo. Regiom.* 1732.), SEDILLOT (*Recueil Périodique*, t. vii. p. 194.), MEIER (BALDINGER's *Magazin*, b. iii. p. 399.), GUERSENT (*Bulletins de la Faculté de Méd.* Z. 1.), by BOUILLAUD (*Archives Génér. de Méd.* t. i. p. 531.), and by Mr. W. KING (*Guy's Hosp. Rep.* part xv.). In all these the parietes of the œsophagus have been either ulcerated, rupture taking place in the seat of ulceration, or softened and attenuated in the manner already described (§ 4.).

II. INFLAMMATION OF THE ŒSOPHAGUS.

— SYN. *Œsophagitis*; *Inflammatio Œsophagi*; *Inf. Gulæ*, Auct. *Œsophagite*, Fr. *Entzündung der Speiseröhre*, Germ.

CLASSIF. — III. CLASS. I. ORDER (*Author*).

14. DEFIN. — *Pain between the shoulders, or behind the trachea or sternum, augmented by deglutition, which is rendered more or less difficult or even impossible, with symptomatic fever*, &c.

15. Inflammation of the œsophagus occurs more frequently in a *complicated* and *consecutive*, than as a *simple* and *primary* disease. It varies as to its *intensity* and form or *character*, and as to the particular tissues of the canal in which it may occur. It may be *acute*, *subacute*, or *chronic*; it may be limited to the mucous surface, or it may extend to the more external coats, through the medium of the connecting cellular tissue; it may even affect only the mucous follicles of the canal, the internal membrane being either entirely exempt, or affected only in the immediate vicinity of the follicles.

16. *A.* CAUSES. — *a.* Œsophagitis is most frequent during infancy and childhood, but it is occasionally also observed during middle and advanced age. Long-continued and severe dyspepsia, constipation, the abuse of spirituous liquors, the habit of wearing too warm clothing around the neck and throat, the use of tightly-laced corsets, the strumous diathesis, and sanguine and plethoric habit of body, *predispose* to it.

17. *b.* The *exciting causes* are chiefly those physical agents which act directly upon the canal, and diseases of adjoining organs or parts which extend to it, either in their course, or upon their disappearance in their original seats. The former are draughts of cold fluids, or the ingestion of ices, whilst the body is overheated or perspiring; the deglutition of too large a mouthful, or of too warm fluids or substances; or of hard irritating bodies; the abuse or incautious use of irritating medicines, as iodine, squills, ammoniacum, ammonia, &c.; exposure of the neck and chest of females; the use of highly seasoned or spiced articles of food; the accidental or intentional ingestion of acrid or corrosive poisons, as the mineral acids, the bi-chloride of mercury, preparations of arsenic, &c.; acrid and septic animal poisons, particularly those developed in preserved or smoked meats, mushrooms, &c.; and the injudicious ex-

hibition of acrid emetics. Œsophagitis is often caused in young children, by sore nipples, and by an unhealthy state of the milk of nurses.

18. This disease may also occur upon the disappearance of cutaneous eruptions, or after the suppression of accustomed secretions and discharges. It may appear in the gouty or in the rheumatic diathesis, and thus assume a modified form; but it is very rarely a consequence of suppression or metastasis of either of these diseases. It most frequently occurs during the progress of some diseases, and as a sequela or extension of others, particularly of eruptive fevers, aphthæ, erysipelas, pertussis, inflammatory affections of the fauces and pharynx, and of the internal surface of the stomach.

19. Œsophagitis is, moreover, not only caused by, but also often *complicated* with, one or other of the foregoing diseases, particularly scarlatina, small-pox, erysipelas, aphthæ, gastric and mucous fevers, inflammation of the fauces and pharynx, or inflammation of the stomach. In nearly all these associations, the inflammation of the œsophagus is a consecutive affection; but, although arising from the extension of the inflammatory action, chiefly by continuity of surface, it is not the less important as respects its consequences. Inflammation of the internal surface of the œsophagus, may also be complicated with *spasm* of some part, or of the whole, of the canal. In this case, the irritability of the muscular coat of the tube is so inordinately increased, in consequence of the inflamed and sensible state of its mucous surface, that it becomes spasmodically and painfully contracted upon the passage of substances along it. The disease is also occasionally complicated with chronic laryngitis, this latter affection being consecutive upon the former. A case of this description lately came before me. The laryngeal affection, which, owing to the paroxysms of suffocation and cough accompanying it, was the prominent complaint, and attracted the chief attention, was removed after the treatment had been appropriately directed to the primary disease.

20. ii. SYMPTOMS. — *A. Of acute Œsophagitis.* — Pain in some form or other is always complained of, and is usually accompanied with a sensation of heat. It extends in general behind the trachea, from the middle of the throat to between the shoulders, and the ninth dorsal vertebra. This burning pain varies in degree, is sometimes chiefly felt about the bottom of the pharynx, and behind the glottis; at other times, behind the sternum and xyphoid cartilage; and is occasionally accompanied with the sensation of a foreign substance in one of the above situations. In some instances the pain is dull and slight, and in others attended by the feeling of a cord extending in the course of the canal. In all cases, the pain or uneasy sensation is greatly augmented by deglutition; so much so, on some occasions, that the patient either obstinately refuses to swallow, particularly liquids, or experiences an instant regurgitation of them. Sometimes, in the more acute cases, the matters thus thrown up are ejected forcibly through the nose; or irritate the glottis so as to occasion violent and suffocative fits of coughing. Independently of the regurgitation of matters attempted to be swallowed, there is frequently an expuition of a glairy fluid, secreted from the pharynx and upper part of the œsophagus. The patient is generally tormented with thirst and singultus. This latter symptom is seldom wanting when the lower part of the tube is inflamed. In this case, the more consistent substances which are swallowed are arrested by spasm of the inflamed part, occasioning great pain, generally referred to the space between the shoulder-blades, and are afterwards ejected or vomited, with a considerable quantity of mucus, sometimes streaked with blood.

21. In *children*, œsophagitis, in its more acute states, is not infrequent, particularly during infancy; and in them the diagnosis is difficult. The child generally refuses drink, or drinks little, cries, and regurgitates the ingesta. Hiccup is almost constant, and frequently vomiting, which does not often occur in the adult from this disease. When the milk is thrown up unchanged, we should always suspect the existence of inflammation of the œsophagus.

22. Besides the foregoing, there are also many of the usual signs of symptomatic fever, generally of the inflammatory type, but frequently of a remittent form. The tongue is red at its point and edges, sometimes throughout; at other times it is loaded and furred in the middle and base. The fauces are red and injected, or natural; the uvula is generally relaxed. The bowels are confined; the urine scanty and high-coloured.

23. iii. TERMINATIONS. — *Acute inflammation* of the œsophagus may terminate — (*a*), in resolution — (*b*), in suppuration — (*c*), in softening of the coats of the canal, or — (*d*), in gangrene, or — (*e*), it may pass into a chronic state of disease. — *A. Resolution* takes place generally with a gradual subsidence of the acute symptoms, and a more copious discharge of mucous or muco-purulent fluid; or with critical evacuations, as hypostatic urine, copious perspiration, &c.; it occurs chiefly on the fifth, seventh, ninth, or eleventh day; and occasionally with the exudation of an albuminous substance, the discharge of which disposes to a resolution of the inflammatory action. This substance is secreted on the internal surface of the tube, as in croup, forming a false membrane, sometimes extending upwards to the pharynx and fauces. As the inflammation subsides, this false membrane is thrown off from the mucous surface, the secretion of the mucous follicles gradually detaching it from its adhesions to this surface, and it is passed with the ingesta into the stomach.

24. *B. Suppuration* sometimes occurs in one or other of two forms. — 1st. The purulent matter may be discharged, in consequence of violent inflammation, from the whole internal surface of the tube. This, however, seldom takes place unless œsophagitis is occasioned by very irritating ingesta. I was called some years ago to a case of this description by a practitioner in Westminster. The patient, a robust young man, had attempted to poison himself with laudanum. In order to procure the evacuation of the poison, a considerable quantity of mustard mixed with warm water was exhibited. This produced full vomiting, after the other means had failed. Inflammation of the œsophagus, however, in its most distressing form supervened, and in the course of two or three days was followed by a most copious and entirely purulent discharge regurgitated from the œsophagus. The quantity discharged be-

tween each visit, and collected in the vessel, was surprising. He, nevertheless, recovered, and without any affection of the nervous system, as is often observed after poisoning from opium. — 2d. *Suppuration* more commonly occurs when the inflammation attacks a part only of the tube, and implicates all its coats. A distinct abscess usually forms in this case, most frequently in the cellular tissue connecting the mucous with the muscular coat. It occurs in neglected cases of the disease, and in scrofulous habits; and is generally indicated by the complete stop put to deglutition, by great thirst, excessive pain, and by a sense of fulness, and of pulsation in the situation of the œsophagus. In most of the cases on record the abscess has burst into the canal, either spontaneously upon efforts at deglutition or vomiting, or upon introducing a bougie or probang along the passage; and the patient has obtained instant relief. Interesting cases of this description have been published by M. Bourguet (*Gazette de Santé*, 1823, p. 221.), and by M. Barras (*Archives Gen. de Méd.*, t. x. p. 134.). Recovery generally takes place rapidly after the matter is discharged; — it either passes into the stomach, or is ejected upwards.

25. *C. Gangrene* occasionally terminates in inflammation of the œsophagus, but not so often as is stated by some writers. It occurs chiefly after œsophagitis complicating scarlatina, or following that disease, in which circumstances I have observed it on several occasions, generally, however, associated with gangrenous *pharyngitis.* I have, likewise, seen it after œsophagitis caused by poisonous ingesta, particularly the animal poison generated in preserved or spoilt meats. Although it may commence previously to dissolution, yet the morbid appearances usually described as constituting this change are somewhat increased after death. When the inflammation terminates, the sphacelus is chiefly confined to the internal surface of the tube, which presents more or less, along its whole extent, soft, tumified patches, of an irregular form, of a dark grey or slate colour, and emitting a peculiar fœtid odour.

26. The *symptoms* indicating this change during the life of the patient are not always manifest. Two cases of this mode of termination, occurring independently of poisoning, and of complication with scarlatina, have come before me in practice, and were recognised during life, and verified by an examination after death. The one occurred in a child, the other in an aged female. In both, great tumefaction and tenderness of the lateral and anterior parts of the neck; a deeply encrusted tongue, with a dark sordes; a feeble, small, unequal and intermittent pulse; singultus, and frequent fœtid eructations; great prostration of strength, with leipothymia, and cold clammy perspirations, were remarked. There was no vomiting; but in one of the cases a small quantity of an offensive sanguineous mucus was occasionally regurgitated upwards shortly before death.

27. *D.* The *changes of structure* most commonly observed in fatal cases of acute œsophagitis are injections in patches, striæ, or generally, of the mucous surface, with partial destruction of its epithelium, particularly in infants. This surface is usually reddened, the tint, however, varying from a rose-hue to a reddish-brown. The mucous membrane is commonly tumified, its subjacent cellular tissue thickened, injected, infiltrated with a serous or sero-puriform or sanguineous fluid, and both the one and the other softened and more easily torn than natural. Sometimes they are reduced to a nearly pulpy state, and are of a reddish-brown, or purple colour. The sub-mucous cellular tissue sometimes presents minute collections of a puriform matter which elevate the internal surface into pustular eminences. The whole parietes of the canal are softened, sometimes œdematous, injected with blood and more lacerable than usual. In rare cases, purulent collections form exteriorly to the muscular coat. Ulceration seldom occurs after this state of inflammation: it is more frequently met with after that hereafter to be described. When, however, it does occur, the ulcerated part generally varies in size and in depth; the parts in its immediate vicinity being very much softened, inflamed, and somewhat thickened or tumified.

28. *E.* The changes produced in the œsophagus after the ingestion of strong acids are generally of a disorganising nature in the more rapidly fatal cases. The mucous surface is eroded and of a brownish, or brownish-black hue, and the tube generally more or less constricted. The erosion or partial solution of the internal surface sometimes extends to the connecting cellular tissue, so that the muscular coat may be readily denuded, as by rubbing a sponge firmly along the exposed surface.

29. iv. Sub-Acute and Chronic Œsophagitis. — *A.* The less active forms of the disease are more frequent than the acute. They may take place primarily, or they may be the consequences of neglected, or partially subdued, states of acute œsophagitis. Many of the slighter cases that have occurred primarily never come before the physician until organic changes seriously interrupting the process of deglutition have taken place. —*a.* The slight or chronic states of œsophagitis are characterised chiefly by the same symptoms as characterise the acute form (§ 20.), but in a milder degree — by soreness and tightness under the sternum or between the scapulæ, the discharge of a ropy fluid, or acrid eructations, sometimes rumination after a full meal, by a hawking or short cough, or frequently hawking or spitting, by a weak irritable pulse and emaciation; and sometimes by obstinate dyspepsia and costiveness.

30. *b.* The chronic states of the disease are generally *caused* by previous disorders, particularly by inflammatory or neglected dyspepsia, inflammations of the internal surface of the stomach, by eruptive fevers and inflammation of the fauces or pharynx; by the acute states of the disease, and by the causes producing these states.

31. *c.* The milder or more chronic states of œsophagitis *terminate* in resolution, or in some one or more of the organic lesions described in another section of this article, or in *thickening* and *induration* of the parietes of the canal, generally with some degree of *stricture*, and in ulceration.

32. *B.* Thickening and induration of the parietes of the œsophagus sometimes take place after repeated attacks of inflammation; but generally after chronic inflammation, occurring either in its primary form, or consecutively on the acute state. Thickening of the parietes is usually accompanied

with narrowing of the passage, forming permanent stricture or obstacle to the passage of the ingesta into the stomach. This change may affect the whole of the canal in a greater or less degree, or it may be limited to any one part of it.—*a*. The circumstances which especially favour this *termination* are, inefficient modes of cure; the taking of stimulating food too soon after the acute stage of disease has been subdued; the injudicious use of astringent and tonic medicines, particularly gargles, which have been suggested by the state of the fauces and uvula that I have described as frequently accompanying the different states of the disease; and the strumous diathesis. But I believe that the most frequent cause of this lesion is the use of ardent spirits, as has been proved by the observations of MICHAËLIS (HUFELAND *und* HIMLY, *Journ. der Pr. Heilkunde*, 1812, p. 52.). This state constitutes the *permanent organic stricture* of Dr. MONRO, and is ably illustrated in his work on the morbid anatomy of the digestive tube.

33. *b.* The *symptoms* of thickening of the parietes, with stricture, of the œsophagus, are the continuance of dysphagia after the decline of the more acute symptoms; dyspnœa, obscure pain, soreness, and a sense of tightness in the course of the œsophagus; sometimes the discharge of a very tenacious mucus; impaired digestion, despondency, costiveness; and febrile exacerbations. In some cases, a gurgling sound is heard upon attempts at swallowing fluids, and a portion of them is regurgitated, exciting a choking cough. The deglutition of more solid substances is slow, difficult, and painful. The patient often feels the substance lodged some time in the canal; and, afterwards, as if forcibly thrust through a narrowed passage. When the stricture is seated low in the canal the portion above it is often very much dilated, forming a sac in which the ingesta lodge, and whence they are afterwards partly regurgitated and partly pass into the stomach. In *thickening* of the parietes of the œsophagus and *permanent stricture*, fluid substances are more readily swallowed than those possessed of some degree of consistence; whilst in *spasm* of the œsophagus, fluids pass with greater difficulty and distress to the patient.

34. *c. Permanent stricture* of the œsophagus, although generally resulting from inflammatory action of the kind now described, may occasionally also proceed from a different cause. It may, although rarely, arise from *scirrhous degeneration*, or from tumours of a *fibro-cartilaginous* nature developed in the parietes of the tube. I believe, however, that a great proportion of the cases which have been said to be *scirrhus* of the œsophagus, have been only the simple thickening and induration resulting from chronic inflammation. Permanent stricture of this passage may also result from the enlargement of, and pressure upon the tube, occasioned by a cluster of enlarged lymphatic glands. This is, however, a rare occurrence, and is chiefly met with in childhood and early life, in those of a strumous diathesis, and in whom the submaxillary, and other superficial glands, are tumified; whilst scirrhous degeneration occurs at an advanced age, and is attended by appearances of the scirrhous cachexia. The dysphagia arising from the pressure of tumours exterior to the tube is seldom or ever so urgent as that which depends upon narrowing of the passage from change of the parietes themselves. The pressure on the œsophagus produced by aneurism of the aorta, even shortly before its opening into this canal, seldom occasions very marked difficulty of deglutition. This distinction has been judiciously remarked by MONDIÈRE, and is based on the cases recorded by MM. BERTIN, LAENNEC, BOUILLAUD, RAIKEM, OUVRARD, and others. This canal may also be partially obliterated from increased thickening — a hypertrophy of the mucous membrane itself, which is also as if puckered or drawn together. In the majority, however, of such cases, there is permanent constriction also of the circular muscular fibres of the part affected.

35. *Permanent stricture* of the œsophagus, whether proceeding from inflammatory thickening and induration of its coats, from scirrhous or other formations, or tumours developed in the parietes of, or external to the tube, may be seated in any part of the tube, either at its commencement in the pharynx, or in any intermediate portion between this and its termination at the cardia. Sir E. HOME thinks that it occurs most commonly in the former situation; but, although this may perhaps be, upon the whole, the part most frequently affected, the other parts are also not unfrequently the seat of this change. It is, however, generally remarked that, even when the disease is confined to the lower portion of the tube, many of the more urgent symptoms are often referred to the lower part of the pharynx and top of the œsophagus.

36. *d. The Diagnosis of permanent Stricture of the Œsophagus* is sometimes difficult. This lesion may be confounded with spasm of the tube, with inflammation of the internal surface of the canal, with disease of the cardiac orifice of the stomach, or even with affections of the larynx and trachea: or these maladies may be mistaken for stricture of this tube. The permanence of the symptoms, generally attributed to this stricture, would serve to establish the existence of it in doubtful cases; if such permanence were always observed, but HEINEKEN, LEROUX, and others have noticed marked remissions in the symptoms of cases of this lesion. In these cases, the exacerbations have been owing to more or less of spasm attending the permanent stricture. Indeed, when difficulty of deglutition occurs in any of the diseases just mentioned as simulating permanent stricture of the gullet, it is generally owing to spasm. In some diseases of the larynx, or of the stomach, spasm may occur in the gullet, as in the case recorded by Mr. SHAW (*Lond. Med. & Phys. Journ.*, vol. xlviii. p. 185.). When difficult deglutition is observed in affections of the stomach, or of adjoining parts, and even in consequence of tumours in the vicinity of the tube, it generally is either owing to, or aggravated by, flatus rising into this canal from the stomach, the flatus occasioning both obstruction to the descent of the matters swallowed, and spasm in parts of the tube. The chief diagnosis, therefore, between permanent stricture of the gullet, and other affections, is thus actually between the former and spasm of the parietes of the tube. Permanent stricture is generally consequent upon inflammation, and is slowly and gradually progressive, until deglutition is impossible. When it is far advanced, the difficulty of swallowing is more or less permanent, although exacerbations are remarked in some cases. The

difficult deglutition which is occasioned by spasm, and is sometimes caused by disease of adjoining parts, occurs chiefly in hysterical and hypochondriacal persons, and in nervous and delicate constitutions. When the difficulty is caused by the pressure of scrofulous or enlarged lymphatic glands, this circumstance is generally rendered apparent by the state of the neck and throat, and by the appearances and sounds in percussion, near the top of the sternum and sternal ends of the clavicles.

37. C. ULCERATION of the œsophagus may occur in consequence of inflammation of its internal surface, in one of two forms; namely, ulceration commencing in the mucous follicles, and ulceration of the mucous and sub-mucous cellular tissue unconnected with change of the state of those glands.—*a*. It has been considered doubtful whether or no the ulceration, which is seated in, and proceeds from a particular change of, the follicles, is actually a consequence of inflammation. It is very probable that obstruction of those glands may give origin to ulceration, and that the inflammatory irritation either preceding or accompanying the ulcerative process may be very slight — and possibly of an unhealthy description. I believe, from several instances which have occurred to me amongst children, that such is the case, and that neither the local appearances nor their causes, nor the attendant circumstances and phenomena, are such as mark sthenic action, or energetic vital endowment. This form of ulceration was first noticed by BRUNNER (*De Glandulis Duodeni*, cap. 10. p. 136.), as occurring in the œsophagus; and I believe that it occasionally proceeds to perforation of the tube, and affects most frequently its lower part, whilst the next form of ulceration is more commonly found in its upper portion.

38. *b*. Ulceration which takes place independently of the follicles, I consider to be more decidedly a result of inflammatory action, than the foregoing variety. The procession of phenomena in cases of this description appears to be the following: — The inflammation of the mucous surface often implicates more or less of its subjacent cellular tissue, and a serous or sero-puriform fluid is effused in distinct points, elevating, in the form of pustules or minute blisters, the mucous tissue, the detached portions of which lose their vitality and separate, leaving an excoriated or ulcerated spot, which extends in width and depth, according to the habit and temperament of the patient, to the cause in which the disease originated, and to the treatment employed. Ulcerations of this description, as well as the preceding, are most commonly met with among infants and young subjects, and are frequently connected in them with softening of the coats of the tube. When ulceration occurs in adult subjects or in persons advanced in life, it is generally accompanied with, if not consequent upon, either thickening or narrowing of the parietes of the œsophagus, or both; and it is usually seated in the part above the constriction, excepting in scirrhus of the tube, when the narrowed portion itself often becomes ulcerated, and in this case carcinomatous. But it sometimes is met with independently of either thickening or induration of the parietes of the tube. Ulceration from inflammation of the internal coats of the œsophagus is very seldom seated in several different parts of its surface in the same case — the ulcers of this description being never so numerous as those commencing in the follicles, and rarely exceeding one or two. This kind of ulcer most frequently attacks the upper portion of the canal and extends from three to eight or nine lines in width. M. SCOUTETTEN met with a case, in which the ulcer was twelve lines in diameter and had destroyed all the coats of the posterior part of the tube, and had even laid bare the anterior part of one of the vertebræ. Generally, when the ulcer is large, one only is found. SIR EVERARD HOME thinks that the posterior part, or that applied to the vertebræ, is more usually the seat of ulceration; but this is not satisfactorily shown. There can be no doubt that this form of ulceration occurs more frequently in the upper part of the tube, whilst the ulceration which originates in the follicular glands is more usually found at its lower part, and is more generally consequent upon eruptive fevers and febrile diseases, particularly those characterised by depressed energies of life. Ulceration of the œsophagus may occasion ulterior effects of a very important character, previous to its usual termination in death. A case, to which I shall more particularly allude, occurred to me where it occasioned a fatal hæmorrhage. And Dr. MONRO mentions a case where the ulcer penetrated the trachea, and occasioned death, by the escape of matter from the œsophagus into the trachea. A similar case I have already noticed as having occurred to ZEVIANI, and another has been seen by myself. *Rupture*, as well as *perforation* of this tube may also be occasioned by ulceration.

39. *c*. *Symptoms*.—When the ulceration is seated in the anterior and superior portion of the œsophagus, posterior to the larynx and trachea, many of the symptoms of laryngitis and tracheitis are observed. An interesting case of this description is recorded by PALETTA (*Exercitat. Patholog.*, p. 228.). Ulcers in the œsophagus are generally accompanied with many of the symptoms which attend simple inflammation of this tube. The pains, however, are usually more acute, particularly upon deglutition; sometimes there is vomiting of a glairy matter, generally streaked or coloured with blood. Solid substances are swallowed with difficulty, but fluids, when taken in considerable quantity, pass with more ease. Salivation often occurs during the last stage of the disease. M. MONDIÈRE mentions a case, in which a large ulcer of the œsophagus was seated near the cardia, and where the patient, during the four months he was under treatment, complained of a burning sensation at the superior part of the epigastric region. This patient frequently rejected rounded and purulent matter, a symptom noticed both by PALETTA and LEROUX. In some rare cases, the ulceration may give rise to sudden death from hæmorrhage. A case of this description occurred to me a few years ago in an aged female, who had been under my care for several years for disorders of the digestive organs, accompanied with psoriasis. A few days previous to her death she was affected with œsophagitis complicated with pharyngitis, and attended by a constant hacking cough, and great depression of the powers of life. I was suddenly called to her about the eighth or ninth day of the attack for sudden and profuse discharge of blood, which was described as having been ejected upwards without

evident effort; but, before I reached her, she had expired. The quantity of blood thus discharged was very considerable. Upon examination, the stomach contained about a pint and a half of blood partly coagulated, and its coats, particularly the mucous coat, were considerably softened. The pharynx was of a dark colour, in patches, some of which were of a purplish tint. In the upper third of the œsophagus, towards its anterior parietes, upon the left side, was a large irregular ulcer, which had destroyed, in some points, the muscular coat, and in all, the mucous and submucous tissue. The internal surface of this part of the tube, particularly around the ulcer, was of purple hue, tumified, soft, and easily torn. The bottom of the ulcer was of a deep red colour, and the subjacent parts red, vascular, and injected. The hæmorrhage had most probably arisen from erosion, by ulceration of some of the small vessels.

40. Ulceration, perforation, and rupture, in consequence of ulceration of the parietes of the œsophagus, are generally followed by death with more or less rapidity; and, until shortly before death, the patient may not have come under treatment, either from the slightness or neglect of the symptoms. Instances have even occurred in which sudden death has taken place, the patient not having had recourse to medical advice, and, upon dissection, a large perforating ulcer has been found in some part of the tube. In a case of this kind, which I saw, the ulcer was seated a little above the cardia.

41. *Scirrhous ulceration*, or *carcinoma* of the œsophagus, most frequently occurs either at the upper or the lower extremity, more frequently extending from either the pharynx or the cardiac orifice of the stomach, than affecting the tube primarily. It rarely or never appears without being attended by the lancinating and burning pains, and the carcinomatous cachexia, characteristic of this disease.

42. *d. The prognosis of inflammation and permanent stricture* of the gullet should necessarily depend upon the causes, progress, complications, and severity of the disease. *Acute* and *sub-acute œsophagitis,* in which the prognosis is generally more favourable, than in the chronic state of the malady and in permanent stricture, should be viewed as a most serious disease, as respects either its more immediate results, or its contingent consequences; and it is still more so, when it occurs in cachectic habits and in the course of exanthematous and continued fevers. When it is caused by powerful stimulants or irritants calculated to produce a local effect merely, without directly disorganising the parts or remarkably depressing the vital power, it is generally removed by appropriate means; but when it is caused by agents which occasion these injurious effects, and which even extend them thence to adjoining parts, the prognosis should be very unfavourable. When the symptoms indicate the passage of the *acute* or *sub-acute* into the *chronic disease*, a cautious if not an unfavourable opinion ought to be formed of it; and, when they indicate the supervention of *stricture*, or of *ulceration* with or without stricture, the prognosis should be very unfavourable, although the result may be long delayed. The history of the case, the previous health and present state of the patient, and the effects of treatment, ought always to be duly estimated in the opinion which is to be formed as to the result.

43. v. TREATMENT.—*A. Of acute Œsophagitis.* —*a.* General and local *bleeding* is indispensable in this state of the disease. Bleeding from the arm should never be neglected; and afterwards local depletion may be employed, either by leeches or by cupping. In œsophagitis, the local bloodletting recommended by CŒLIUS AURELIANUS, viz. the opening of the sub-lingual vein, may be practised. It has received the sanction of the greatest, even in the present day, of practical authorities, that of HOFFMANN, as well as of JANSON and others. HILDENBRAND recommends the application of leeches, in preference to cupping: in children, either or both may be employed according to circumstances. When the local depletion is directed to the throat, leeches are certainly preferable. Next to depletion, as perfect inaction of the tube as possible should be enforced. The patient should be deprived of all ingesta, excepting cooling fluids, which may be used merely to moisten the mouth and throat, without attempting to swallow them. After the acute symptoms are removed, and the necessity of having recourse to light nourishment is urgent, the blandest and most mucilaginous substances, in a semifluid form, and of the temperature of the blood, may be taken. The patient should at the same time be kept quiet, not be allowed to talk, and have the bowels freely evacuated by cathartic enemata, which, while they procure the evacuation of accumulated and hurtful matters, may occasion a derivation of the circulating fluid to the lower part of the digestive tube. In the slighter forms of œsophagitis these means, even without any considerable depletion, will be often sufficient to remove the disease.

44. *b.* When it is necessary to exhibit medicines by the mouth, particularly those of a purgative nature, my experience leads me to prefer a full dose of calomel, either alone or combined with James's powder, exhibited in a semi-consistent substance. The advantages resulting from the use of calomel are that it diminishes vascular action in the part to which it is immediately applied, whilst it occasions vascular derivation to the lower part of the intestinal canal. It may be mixed in some sweet butter, which should be allowed to melt gradually and pass insensibly along the œsophagus; the mouth being guarded by subsequent ablution. When it is necessary to act decidedly on the bowels, and yet prevent the increase of thirst — one of the most distressing symptoms of the disease — the supertartrate of potash, with a fourth part of the sub-borate of soda, given in the form of electuary and combined with confection of senna, and the inspissated juice of elder-berries, is one of the best means that can be employed. If the inflammation be attended with much spasm of the tube, or if an irritable state of it still continue after depletions, or if the morbid action be apparently still unsubdued, the hydrochlorate of ammonia or nitre should be prescribed in the form of linctus or mixture with mucilages, syrups and anodynes, in frequent doses; and these, swallowed gradually and often, will generally afford marked relief. When the upper part of the tube is affected, some benefit may be procured from the use of emollient fo-

mentations and poultices to the throat, particularly after the application of leeches to the part.

45. *c. Revulsive* or *derivative means* are sometimes of service, especially when they follow, as they always should, vascular depletions carried as far as the state of the case may require. Revulsions ought to be prescribed in a decided manner; for, in order to be beneficial, the artificial irritation should surpass in degree that which it is intended to supersede. The irritation of blisters whilst inflammatory action remains unsubdued will often chiefly tend to increase febrile commotion, and thereby to augment the local excitement. As to the means of derivation and the situation of applying them, opinions are various. Bleuland recommends blisters and moxas to be applied between the shoulders. Many prefer sinapisms and irritating pediluvia. The turpentine embrocation or epithem applied to the throat and sternum, or between the shoulders, or a mustard poultice in the same situations, are the most decided and the most rapid in their effects. Either of these may be used for children; but blisters ought not to be applied to them for a longer period than three or four hours, when a warm bread and water poultice should replace them.

46. *d.* Œsophagitis, in various degrees of activity is not infrequent in *children*, but it is often complicated with inflammation of the fauces and pharynx, or with bronchitis, or with inflammation of the villous surface of the stomach; and is generally seated in the mucous membrane, seldom extending deeper than the sub-mucous tissue. In them also the mucous follicles are often chiefly implicated. The local affection is, moreover, often associated with weak vital power, and sometimes with general cachexia — circumstances which require a very modified practice. After active inflammatory action has been subdued by depletion, or independently of depletion, in this latter class of cases, I have derived much advantage, particularly in the complications now alluded to, from the hydrochlorate of ammonia, or the subborate of soda given in honey, or in the inspissated juice of elder-berries and syrup of marsh-mallows, or of roses.

47. *e.* Œsophagitis *complicated* with the inflammations just mentioned, requires very nearly the same treatment and regimen as above recommended. But when it supervenes in the course of eruptive or continued fevers, very different means are necessary, and particularly when those fevers acquire an asthenic or malignant character. I have seen several cases of this description in children and young persons, and have never obtained in them any advantage from vascular depletion, except from a cautious recourse in some cases to local depletion. The mineral acids, particularly the muriatic, camphor, the pyroligneous acid with camphor, the boracic acid, and sub-borate of soda, small doses of the sulphate of zinc, or of the sulphate of quina in confection of roses; the solution of the acetate of ammonia with camphor mixture and the decoction of marsh-mallows; the hydrochlorate of ammonia or the nitrate of potass in the syrup of roses, &c., are severally beneficial in these associations of the disease. When œsophagitis is complicated with pharyngitis, as observed in the more malignant states of scarlatina, or in other exanthematous and continued fevers, the sulphate of quinine, the preparations of cinchona with camphor or the mineral acids, particularly the hydrochloric; or the decoction of bark with the chlorate of potash; or small doses of the chloride of lime in honey or syrup, may be prescribed; the derivative means above noticed (§ 45.) being also employed.

48. *B. The sub-acute and chronic states of œsophagitis* require similar means to the above, but in a less active form. In these, local depletions are often required, and they may be repeated according to circumstances. Purgatives are generally also necessary. The frequent use of refrigerant, demulcent, and soothing linctuses and mixtures, as almond emulsion or syrup of marsh-mallows with hydrocyanic acid, or the mucilages and syrups with sal ammoniac or nitre, should not be neglected. In some cases of the chronic, as well as of the acute, form of the disease, calomel or the grey powder may be mixed with a little fresh butter, and placed upon the tongue. As this melts, and is gradually and slowly swallowed, a healing effect is produced by it upon the inflamed surface. When there is reason to infer the existence of ulceration, this is often of service. If the bowels require further aid, enemata should be administered. Advantage will often accrue from the more permanent derivatives, as blisters frequently repeated, or kept open and freely discharging, and pustulation by means of the tartarised antimonial ointment, or of croton oil, rubbed in the situations about to be mentioned. In the more obstinate cases, moxas may be applied, or an issue made near the top of the sternum, or a seton inserted in the nape of the neck.

49. For *permanent stricture* (§ 34.), as well as for *ulceration* (§ 37.) *of the œsophagus*, the same means as have been advised for chronic œsophagitis may be employed. If these fail, after having been fully and appropriately tried, surgical aid should be obtained, and *dilatation* or *cauterization* be had recourse to. But of these and other surgical measures it is not my duty to treat.

III. Hæmorrhage from the Œsophagus. — Syn. *Œsophagorrhagia; Blutung aus der Speichelröhre*, Germ.

Classif. — *See art.* Hæmorrhage.

50. Hæmorrhage very rarely takes place from the œsophagus, unless from mechanical injury. When occurring spontaneously the source of the hæmorrhage is ascertained with great difficulty during the life of the patient. Blood effused from the internal surface of this tube is seldom excreted directly upwards, but generally passes almost insensibly into the stomach, where it is partially digested and carried with the other ingesta into the intestines, if it be in small quantity, or is *vomited*, if the effusion be very considerable. In this latter case, hæmorrhage from the œsophagus simulates Hæmorrhage *from the stomach* (*which see*). The chief circumstances which lead us to suspect, when blood is discharged upwards in any way, that it is effused from the internal surface of the œsophagus, are the symptoms of previous disease of this part, especially pain and heat in the course of the canal, with difficulty of, and increased pain on, deglutition; and a sense of heat and titillation behind the trachea, in the situation of the tube. Hæmorrhage seldom or never occurs in this part of the digestive canal, unless from pre-existing disease of a severe character, as inflammation terminating in ulceration, a case of which I have had an op-

portunity of observing; or from the presence of a foreign body lodged in the canal, circumstances tending to facilitate the diagnosis; but without which, it will be difficult to determine whether or no the hæmorrhage proceeds from the stomach, or even from the respiratory organs. The phenomenon already alluded to is calculated to confound it with hæmatemesis, whilst the cough, which frequently accompanies disease of the œsophagus, particularly when seated in its upper portion, is likely to mislead us, and to suggest its origin in pulmonary disease.

51. *Treatment.*— When the source of the effusion is tolerably manifest, the treatment differs but little from that which is indicated in hæmorrhages from other parts. It should have reference to the states of vital power and of vascular tone. Œsophageal hæmorrhage very rarely occurs under circumstances requiring general or even local blood-letting. The application of cold externally — as a stream of cold water poured on the throat; the use of ices, as the lemon ice, or of acids and other astringents internally, particularly in the form of linctus or electuary, or in any semi-fluid vehicle, are means which should never be overlooked. The most certain remedy, however, in these cases, is the spirits of turpentine mixed with honey or the yolk of an egg, and taken in repeated doses. In addition to these, hot pediluvia, cathartic enemata, sinapisms, blisters, and other derivatives, may be prescribed. As hæmorrhage from this part is generally consequent upon *chronic œsophagitis* and *ulceration*, the same treatment as already recommended for these diseases (§ 48. *et seq.*) should generally be instituted after the effusion has been arrested.

IV. SPASM OF THE ŒSOPHAGUS.

—SYN. *Spasmodic stricture of the œsophagus. Œsophagospasmus; der Speiseröhrenkrampf*, Germ. *Œsophagisme*, Fr.

CLASSIF.— II. CLASS. I. ORDER (*Author*).

52. DEFIN.— *Difficult and painful deglutition, occurring either suddenly, and without evidence of previous disease of the œsophagus, or as a symptom of such disease, and of several nervous affections.*

53. This affection has attracted but little attention, although the justly celebrated HOFFMANN wrote a treatise on it (*De Spasmo Gulæ Inferioris*, Halæ, 1733.). It is, I suspect, in its slighter forms, more frequently brought before the physician than recognised by him. It forms a most distressing part of the series of morbid phenomena attending rabies, tetanus, hysteria, and hypochondriasis; and it constitutes the form of dysphagia which is sometimes met with in delicate and nervous females, particularly those in whom the uterine functions are disordered, or the uterus itself in an irritable and slightly inflamed or congested state.

54. i. CAUSES.— The circumstances just alluded to may be viewed as *predisposing causes* of this affection. It may also be considered as occasionally appearing hereditarily, particularly in connection with the nervous temperament, and delicate and hysterical constitution.— The most common *exciting causes* are swallowing cold fluids when the body is perspiring; fits of anger or passion in nervous or irritable persons; the irritation occasioned by the ingestion of acrid, unwholesome, and injurious substances; and flatus rising into the canal and causing spasm of one part and dilatation of another part adjoining the former, particularly upon attempts at deglutition. Owing to this last cause, temporary spasm of the œsophagus is not an infrequent occurrence during the course of dyspeptic, hysterical, asthmatic, and hypochondriacal affections. Indeed, the dysphagia otfen attending the slight or imperfectly developed form of hysteria, consisting chiefly of the globus, or of borborygmi, is entirely owing to œsophageal spasm — or rather, this spasm is chiefly the cause of these phenomena, especially when a portion of the tube is distended by flatus. That spasm of this tube is often *symptomatic* of inflammations or irritations of the stomach, and of the uterus and ovaria, is fully established. HOFFMANN states that it is often attendant upon inflammation of the upper portion of the spinal marrow. It has also been caused by inanition, by worms rising into the canal from the stomach, by sea-sickness, by excessive retchings or vomitings, by menstrual or uterine irregularities, and even by powerful mental emotions, particularly those of a depressing kind. It forms a most distressing symptom of rabies, and is a chief cause of the distress which attempts at deglutition occasion in that malady; although spasm of the pharynx is also present in that as well as in some other diseases in which it is a prominent phenomenon. Œsophageal spasm is occasionally caused by the influence of the imagination, as shown by impossible deglutition, or the forcible regurgitation of a substance through the mouth or nose, when disgust is conceived against it, and by attempts to take disagreeable medicines by children or even grown-up persons. GRAPENGEISSER says that he has seen this spasm produced by electricity. It has already been stated (§§ 19, 20.) that it heightens the distress in cases of acute, sub-acute, and chronic œsophagitis.

55. ii. The SYMPTOMS *of œsophageal spasm* are chiefly the sudden occurrence, without previous disorder referable to the œsophagus, of difficult or even impossible deglutition, and pains excited by attempts to swallow that are felt in some portion of the tube. The symptoms vary with the part of it affected. When the spasm is seated at the top of the œsophagus and pharynx, then deglutition is almost or altogether impossible, and substances are forcibly rejected. When it is seated in the lower portion, then the morsel swallowed is arrested at its seat, and is either immediately regurgitated, or remains there for a considerable period, when it slowly passes into the stomach, or is violently ejected from the canal. If the spasm be attended, or is caused, by flatulent distension of a portion or portions of the tube, attempts to swallow are often very painful, difficult, or even choking; but the distress is relieved, or entirely removed, by eructations of flatus, the dysphagia occurring only at the commencement of eating, although it sometimes only occurs towards the close. In some instances the most urgent distress is produced by the retention of the substances swallowed in the œsophagus, attempts to pass them into the stomach or to reject them being equally unavailing. I have seen this occurrence connected with the presence of flatus in the tube.

56. The nature, consistence, fluidity, and temperature of the substances taken often influence, or aggravate, or alleviate the symptoms, but in no uniform or definite manner. In some cases, fluid or warm substances are most easily swallowed, in

others consistent or pulpy, or semifluid, or cold food.

57. The *duration* of this affection varies with its causes, and with the disorders of which it is a symptom, or with which it is associated. It may be hence of very short continuance, and may not again recur; but where it has once appeared it generally returns after irregular intervals, or upon the recurrence of its causes. When symptomatic of, or associated with, any of the disorders above alluded to, it is very prone to recur as long as they exist, although it may be removed for a time, or prevented from recurring, by attention to diet and by treatment. Fear of its occurrence often assists in occasioning an attack, as well as in aggravating its severity.

58. iii. Treatment.—The cure of this affection, which, as above shown, is most frequently symptomatic, must necessarily depend upon the nature of its pathological cause and relations. When it seems to arise from inflammatory irritation in the œsophagus itself, the means advised for acute and chronic œsophagus (§§ 43. 48.) should be employed. If it appear to proceed from irritation and debility of the stomach, as frequently is the case, particularly when it is attended by flatus, the treatment recommended for the more inflammatory states of indigestion (*see* that Article) is appropriate. When it accompanies other hysterical phenomena, or inflammatory irritation, or congestion of the uterus or ovaria, or irregularities of the catamenia, the means prescribed for those affections (see Hysteria, Menstruation, Ovaria, and Uterus) should be prescribed.

59. In most instances, however, whether idiopathic or symptomatic, means directed to the affection itself should be employed, linctuses or demulcent mixtures, containing a combination of narcotics or anodynes with antispasmodics, as the syrup of poppies or the compound tincture of camphor with small doses of borax, or of nitre, or of the hydrochlorate of ammonia; the hydrocyanic acid, or the extract of belladonna in mucilage and the syrup of orange-peel; or the bitter infusions with these, or with the preparations of henbane or hemlock. At the same time, a belladonna or camphor plaster, or a plaster containing both these substances, may be applied to the throat and upper part of the sternum. A portion of the following embrocation, sprinkled on warm flannel and applied to these parts, is the most immediately efficacious of all other applications that I have employed.

No. 306. ℞ Linimenti Camphoræ Co., Linimenti Terebinthinæ, āā ℥jss.; Tinct. Opii ʒvj. (vel Extr. Belladonnæ ʒss.); Olei Cajuputi ʒj. M. Fiat Embrocatio.

60. Having removed the affection by these or similar means, the return of it should be prevented by a treatment directed to the disorder of which it is frequently a symptom. If it proceed chiefly from chronic debility and nervous susceptibility, tonics and antispasmodics, with generous diet, pure air, and regular exercise, should be enforced. If it arise from an irritable or torpid and weakened state of the digestive organs, stomachic aperients, tonics, antispasmodic and purgative enemata, &c. ought to be given. If it be caused by functional, or congestive, or inflammatory, states of the female organs, or menstrual irregularities, the remedies recommended for the removal of these states, especially antispasmodics, emmenagogues, chalybeate preparations, pure air, regular exercise, and chalybeate or alkaline mineral waters, should be prescribed. In cases of frequent recurrence of œsophageal spasm, particularly when it is connected with hysteria, much advantage will be procured from chewing a piece of camphor, or from holding a piece of it in the mouth, so that the saliva is imbued with it. In these cases, also, as well as in others, the various kinds of ices, or even iced waters, will be found most useful palliatives.

V. Paralysis of the Œsophagus.—*Palsy of the Gullet*, Monro.

Classif.—*See art.* Paralysis.

61. Dr. Monro remarks that there are various degrees of palsy of the gullet, and that in many diseases accompanied by great debility, a teaspoonful cannot be swallowed whilst the contents of a larger spoon readily pass down. The loss of power of deglutition is sudden in some cases and slow in others. In many a difficulty of swallowing solids only is perceived at first; and often the effort of deglutition is attended by much agitation of the frame, amounting in some instances to convulsion. The throat exhibits nothing uncommon, excepting paleness and flaccidity of the uvula and fauces. When difficult or impossible deglutition depends upon palsy, it is persistent or continued; and the easy passage of a probang into the stomach shows that it is not owing to any mechanical obstruction. Palsy of the œsophagus is generally associated with palsy of some other part or parts; palsy of it alone being extremely rare. I have seen palsy of this tube associated with palsy of the pharynx and of the muscles of articulation, no other part being paralysed, in three or four cases, all of which terminated fatally. It is sometimes symptomatic of hysteria, and it often attends apoplexy, hemiplegia, and the last stages of fever and other acute diseases, in all which it is generally a fatal symptom. I have seen it follow, and alternate with, spasm of the gullet, in the course of severe and anomalous forms of hysteria — the most favourable mode or form of its occurrence.

62. *A. The diagnosis* of palsy of the gullet is easy. The continued difficulty of swallowing small quantities or volumes of any substance, whilst larger quantities are taken with greater ease, distinguish this affection from spasm of the tube,—whilst the passage of a probang shows that there is no permanent obstacle. In the slighter cases, there is much difference in the phenomena of deglutition, some patients swallowing more easily solid than fluid or semifluid substances, whilst others can take the latter with most ease. Some swallow with rapidity, or endeavour with great effort to project the morsel through the canal; others accomplish it slowly, and others again require the aid of fluids to perfect the act. When the palsy is complete, then deglutition is impossible. The alimentary bolus is then arrested in either the pharynx or upper part of the gullet: and it may even pass into the larynx and cause cough or suffocation. Owing to the want of power of swallowing the saliva, a discharge of this secretion from the mouth is usually observed.

63. *B. The causes* of palsy of the gullet are rarely such as act directly on this tube. They are to be looked for at the origins, or in the course

of the nerves supplying this part and the pharynx, particularly of the pneumogastric. Baglivi, Valsalva, Dupuy, and others, have shown that animals which have died after division of these nerves were incapable of swallowing, and have retained the aliments in the œsophagus; and cases have been recorded by Koehler, Wilson, Flándin, Montant, Esquirol, and others, in which this form of palsy was owing to hydatids, tubercles, cysts, tumours, or other organic lesions, at the origin of these nerves, or at the base of the cranium, or in their vicinity. Palsy of the gullet is often a part, and even the most important and prominent part, of the palsy, so frequently observed in the most severe and chronic cases of insanity.

64. *C. The treatment* should depend upon the cause of which this affection seems, in each case, to be the effect. If it proceed from congestion or pressure at the origins of the nerves, local depletions and permanent derivatives are required. If it be viewed as the result of tumours of any description pressing upon the nerves of the tube, the preparations of iodine, particularly the iodides of potassium or of mercury, or a solution of the bichloride of mercury, may be employed. In a case recorded by Wilson, this affection was caused by venereal exostosis of one of the cervical vertebræ, and was cured by anti-venereal treatment. Dr. Monro adduces two cases which were cured by electricity, which agent, however, is not suitable for cases arising from organic disease at the origin, or even in the course of the nerves. Blisters, mustard poultices, stimulating liniments or embrocations, ointments containing strychnine, &c. applied to the neck, throat, or upper part of the sternum; moxas, issues, setons, and blisters kept freely discharging for a considerable time in the same situations; stimulating gargles, and sialagogues; purgative and stimulating enemata, as spirits of turpentine with castor oil, assafœtida or camphor; comprise the most efficient means that can be prescribed for this very unfavourable, and most frequently fatal, affection. When the palsy is slight and symptomatic of hysteria, the means advised for other forms of hysterical palsy (see Hysteria, § 93.) should be employed. Whilst these or other means, which the peculiarities of the case will suggest, are being used, the patient should be sustained by nutritious substances administered as lavements, or conveyed into the stomach by means of an œsophagus-tube.

65. VI. Foreign Bodies in the Œsophagus. — Fragments of bones, or other hard, or solid, or sharp, bodies, are not infrequently swallowed and arrested in some part of the gullet. The usual consequences, when they are allowed to remain for any time in this situation, are inflammation, suppuration, ulceration, and ultimately even perforation, of the parietes of the tube. — *A.* The *symptoms* vary with the size and form of the foreign body, and with the position of it in the part in which it is lodged; but there is always severe pain, remarkably increased upon attempts at deglutition, which is generally attended by spasm and by more or less difficulty, or complete inability to accomplish the act. If the body be large and arrested in the upper part of the tube, or near the pharynx, there are also violent strangulating and almost suffocating paroxysms of cough. When angular or sharp bodies continue long in the œsophagus, they may not merely perforate the parietes, but even ulcerate or perforate adjoining parts as an important artery (Kirby), the trachea, &c., or produce caries of a vertebra (Valpeau), and in still rarer instances dilatation of the gullet above the seat of mechanical obstruction.

66. *B. Leeches* are sometimes swallowed, when drinking water from pools incautiously, and, fastening themselves to the parietes of the gullet, sometimes occasion severe and peculiar symptoms. Accidents of this kind have been noticed by Galen, Celsus, Pliny, and Dioscorides, and in modern times by Larrey, Double, Duval, and others. M. Valpeau states that, besides the pain, they produce a peculiar sensation of suction, with difficulty of swallowing, followed by vomiting of blood; and sometimes by very severe nervous symptoms.

67. *C.* The *treatment* of these accidents is more surgical than medical. When the foreign body can be extracted, to attempt extraction is preferable to pushing it by a probang into the stomach. The nature, size, shape, and chemical composition of the body should guide the physician in his opinion as to the propriety of attempting extraction or the other alternative. In some cases, it may be advisable to try the effect of an *emetic*, when this can be passed into the stomach; but the propriety of having recourse to this treatment should depend upon our knowledge of the obstructing body. In the case of leeches adhering to the sides of the tube, emetics may be employed without risk. As to the surgical means I must refer to modern works in which this subject is treated.

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OSSEOUS SYSTEM, Diseases of. — *The Osseous Structure, or Tissue.*

Classif. — Special Pathology, and Pathological Anatomy.

1. The bones are liable to the same diseases as other parts of the frame—to similar changes of both a constitutional and a local nature to those which affect other structures. Many of these changes are merely results of inflammation arising generally from local causes, but always modified, and sometimes even produced, by constitutional peculiarity or diathesis, or by a vitiation of the fluids and ultimately of the solids of the body, as observed in scrofula, gout, fever, scurvy, &c. Other changes, and these the most serious and often most dangerous, appear independently of inflammation, and are more or less the result of constitutional vice, although frequently excited or developed by local causes, as by contusions or other injuries. I shall consider *first* inflammations of bones and their consequences: and *next*, the organic lesions of bones that appear independently of inflammation, although often accompanied with it in their course.

I. Inflammation of Bones. — Synon. — *Osteitis* (from οστεον, a bone); *Ostitis, Inflammatio ossium. Osteite, Inflammation des os*, Fr. *Die Knockenentzündung*, Germ.

Classif. — III. Class. I. Order (*Author.*)

2. Defin. — *Pain in the situation of a bone, encreased upon firm pressure, or when sustaining a weight, with more or less swelling, and often with symptomatic fever, the substance of the bone being encreased in vascularity and often otherwise changed.*

3. *i. Seat and anatomical Characters.* — Inflammation may attack the substance of a bone, and be limited to it; or may affect chiefly the periosteum, or the medullary membrane, and extend thence through the substance of the bone, or may extend from the latter to these membranes. In either case, the inflammation may affect a portion only, or the whole bone; or it may be limited to the body, or to the articular extremity. When commencing in the external or internal layers of the bone, it often is confined for a long time to them, but it frequently extends to the whole structure, especially in the spongy bones, and in young subjects.

4. Osteitis is generally a chronic disease, — or it is rarely so rapid in its course as inflammations of other organs,—a circumstance manifestly owing to the nature of the osseous structure. The most acute or rapid forms of the disease are usually from several weeks to some months in duration, whilst the most chronic states may endure for several years.

5. Osteitis may occur in any bone, but it is most frequently observed in the more superficial bones, and in the more spongy and vascular in their structure. The bones of the hands and feet, the bodies of the vertebræ, and the articular ends of long bones, are the parts most frequently affected.

6. *The anatomical Changes* consequent upon inflammation of the bones are, encreased size of all the vessels running through the vascular orifices and canals; vascular injections in parts which usually do not contain red blood; and a somewhat reddened and swollen state of the affected bone. In the more prolonged cases, the cells and canals encrease in size, are irregular, or partially run into each other by absorption of their walls, and are filled with a sanguineous lymph, so that the fine membranes lining them are found somewhat thickened. The proportion of lime in the bone is sometimes more or less reduced, according to the duration and intensity of the inflammation; and occasionally the periosteum is thickened and relaxed, particularly when the disease commenced in it; and then the surface of the bone usually is rough and porous.

7. ii. *Causes.* — Osteitis is more frequently met with in children than in adults.—*a.* The *predisposing causes* are the rheumatic and gouty constitution, the scrofulous diathesis, and the scorbutic and syphilitic contamination of the frame. Of these, the scrofulous, syphilitic, and scorbutic vices are the most influential.— *b.* These often also *excite* osteitis.—*Rheumatism* frequently attacks the fibrous tissue covering the bones, and the inflammation, thus originating, often extends to the bone itself, and terminates in caries. Articular osteitis occurring in adults generally originate in rheumatism.—*Gout* occasionally excites articular osteitis, chiefly in persons advanced in age, and after repeated attacks.—*Scrofula* is a most influential predisposing and exciting cause of osteitis, in both children and adults, particularly in the short bones, and in the spongy ends of long bones. It also favours the passage of the disease into caries. — *Scurvy* seldom affects the bones until it is far advanced, and then it implicates the dense structure of the bones, rendering it softer, and favouring the rapid supervention of caries, as fully shown by M. J. L. Petit.—*Syphilis* inflames the bones often consecutively upon periostitis, and frequently gives rise to exostosis.—*Exhaustion* of vital energy, venereal excesses and masturbation, fevers, and visceral disease, also favour and even directly cause osteitis; but in these cases the vertebræ are the parts most frequently affected.

8. *c.* The more *local causes* are usually *exciting* only, and often concur with the preceding in developing the malady. Every kind of external or local injury, as fractures, contusions, wounds, pressure, &c.; intense heat or cold, applied to an extremity or part; inflammations, particularly

those which are chronic, in the immediate vicinity of a bone; and suppuration or purulent collections coming in contact with it, are the most common and active causes.

9. iii. *Symptoms.* — At the commencement of osteitis the patient feels a dull, sometimes an acute pain within the bone or deeply seated. The pain is encreased upon firm pressure, and upon any exercise that affects the bone, as standing upon it or supporting a weight by it. This is often the only symptom for a considerable period. After a very variable time, a slightly hard and smooth swelling may be detected, by passing the fingers along the seat of pain, unattended by any discolouration of the surface. The swelling is fixed, and continuous with the surface of the bone; and, although the substance of the bone is generally more or less tumefied, still the chief part of the swelling that is detected is owing to inflammation of the periosteum covering the affected bone.

10. The progress of osteitis is always slow, owing to the low vitality and structure of the affected part; but sometimes the pain becomes extremely acute, and the swelling increases more rapidly, the disease assuming a more acute form. This state is most common to venereal osteitis, and is not readily distinguished from periostitis; excepting that the pain is referred to the bone itself at the commencement, and that the swelling is at first very slight, and the progress of the affection slow. When the swelling is caused by periostitis, its progress is more rapid than that of osteitis, it advances further, is less hard, and becomes at last somewhat soft and elastic. The aching nature, the persistence and the seat of pain, with the modifications of it by position, exertion, &c., are the chief guides we possess as to the existence of inflammation of deeply-seated bones.

11. When the inflammation implicates the *medullary membrane* lining the canals of long bones, and the cells of the spongy structure, this membrane is injected, red, and, according to LOBSTEIN, more dense; and the marrow is augmented in volume, as well as the fluid contained in the cells of the spongy structure. Inflammation of this membrane is not infrequent after amputations, and is then sometimes propagated from the amputated surface along the whole medullary canal. It is attended by the same symptoms as those characterising osteitis; but, when following amputations, it is not so painful, is more rapid in its progress, and more readily passes into suppuration, than in other circumstances, and other states of osteitis.

12. iv. The *terminations* or *consequences* of osteitis are resolution, exostosis and induration, suppuration, gangrene or caries, and necrosis. — *A.* After *resolution*, the structure inflamed regains its former state; but the swelling generally continues for some time after pain has disappeared. — *B. Exostosis* and *induration* are sometimes associated results, whilst either may occur singly. The indurated portion of bone assumes an ivory or dense appearance, more especially in some exostoses. The increased deposition of bony matter — *exostosis* — *hyperostosis* — occurs as *internal* and *external exostosis.* The former, in a lesser degree, is an usual consequence of inflammation; the deposition of bony matter in the diploe necessarily increasing the *weight* and *solidity* of the bone. If the inflammation have been of very long duration, the more the weight and solidity of the deposit are increased, the part assuming an ivory state, and the medullary cavity being encroached upon by the deposition.

13. The *external* form of increased deposition of bone is more common than the internal, and is oftener injurious. In some cases, the bony deposit takes place in the loosened periosteum, which first becomes cartilaginous and afterwards bony, in leaf-like patches, forming *nodes* or *gummata.* In others, the bony deposit occurs in the outer table of the bone, forming a local and defined prominence — a *bony tumour* or *external exostosis.* An exostosis may form simultaneously in the internal and external surface of a bone. This takes place chiefly in the bones of the skull. These bones, and the tubular bones, are the most frequent seats of exostosis; and next to them the vertebræ and pelvis. But they may be produced on any bone; or even on several bones at the same time. They often form in a considerable number in the vicinity of carious bones. They may assume any form, and attain any size, from that of a split pea to that of a child's head. The structure of exostoses varies remarkably. Some are firm, dense, and ivory-like. In others, innumerable bony fibres spring up from the bony surface into the inflamed, spongy, and loosened periosteum. These fibres are harder and closer at their base than at their termination in the periosteum, where they are often soft and cartilaginous. In a third variety, the exostosis seems to consist of an expansion of the external table or surface of the bone, from within, by the effusion or infiltration of matter beneath it. Bony tumours of this kind are common in the lower jaw and bones of the hand. Their interiors are loose, cellular, or spongy, very vascular, and the cavities are filled with substances varying in consistence from lymph to soft cartilage. This last variety becomes much larger than the others, readily inflames, and suppurates; or increases still further in bulk, by dilatation of the internal cells composing them.

14. *C.* When *suppuration* takes place, in addition to the anatomical characters of inflammation, the periosteum becomes fungous or spongy, and less adherent, when the external surface of the bone is inflamed. And this surface is rough, unequal, and eroded, and changed to a greyish or dark hue. If the disease has commenced by destruction of the articular cartilages, the affected bone presents similar appearances. If osteitis has originated in the substance of the bone, the bony structure is softened, is changed to a yellowish, greenish, or brownish tint, and the centre of the softened parts is infiltrated with pus, or with a dirty greyish ichor, of an offensive odour. As the disease proceeds, the softening and discolouration of the bone increases, until *caries* and *ulceration* are established.

15. *D. Caries* consists in a greater or less destruction—*ulceration*—and discolouration of bone, with a secretion of a puriform or of a fœtid sanious matter. Young and spongy bones, abundantly supplied with vessels, most readily become carious. In many instances, owing to destruction of adjoining parts, the periosteum and outer surface of the bone are first destroyed; but when the disease commences in the substance of the bone, a circumscribed abscess is sometimes formed; or the softened portions of bone, infiltrated with a sanious fluid, are partially absorbed or partially

dissolved, as they lose their vitality in the effused fluid, thereby forming ulcerated or fistulous cavities, containing puriform or sanious matters. These cavities, or sinuses, make their way to the surface of the bone, and thence to more external parts.

16. *E. Necrosis*, or mortification of bone, is a frequent consequence of osteitis, as well as of destruction of the periosteum. It may occur in any part of the skeleton, although it more frequently attacks the hard bones, and is always succeeded by the separation of the dead portions of the bone from the living. According to the state of the bone, and the causes and circumstances of the inflammation, of which necrosis is the consequence, the dead bone exhibits various differences. If the bone die in consequence of gangrene of the surrounding parts, the necrosed bone is spongy, light, frangible, and blackish brown. If the necrosis be caused by scurvy or hospital gangrene, it is similarly discoloured and softened. In common necrosis, however, the dead bone is dry, rough, deficient in gelatine, porous or corroded externally, generally white, but sometimes coloured blackish or brown by the offensive sanies poured out around it. When necrosis follows osteitis, it may be either the consequence, or the cause of caries. Mortification sometimes occurs only in certain layers of bone — in the external — *superficial* or *external necrosis;* or in the internal layer or table, — *internal* or *central necrosis;* or the whole substance or mass, — *total necrosis.* The *first* usually arises from exposure or denudation of the bone, but it may also proceed from inflammation of the surface or external layer of bone, and the consequent detachment of the periosteum. *Internal necrosis* occurs almost only in tubular and round bones; *total necrosis* in solid bones also. Total necrosis, especially in tubular bones, is attended by a discharge from the internal surface of the periosteum, and external to the dead bone, of a jelly-like mass, which gradually hardens and is ossified, surrounding, like a sheath, the necrosed bone, or *sequestrum.* As this bony sheath separates from the inclosed sequestrum, or dead bone, it becomes lined by a delicate medullary membrane. In the midst of the bony sheaths are one or several holes — the *foramina grandia* of TROJA, the *cloacæ* of WIEDMANN — which communicate with the existing sinuses of the soft parts, and form an outlet for the continually-absorbed and diminished sequestrum, as well as for the secreted pus or lymph, and when these are discharged, these holes gradually close. In the *internal necrosis* the process is nearly the same; but in this case the jelly-like matter forming the new bone is poured out from the internal surface of the remaining living bone — from the surface of the living bone adjoining the dead bone; the living bone often swelling at the same time, and being somewhat softened.

17. *a. Causes of Necrosis.*— Whatever, either in the substance of the bone or in the periosteum, interrupts the nutrition of the bone, or inflames it, may conduce to necrosis. But if the mischief in the periosteum, medulla, or substance of the bone, be of trivial extent, limited suppuration, or abscess, passing into caries and ulceration, are the more common results. The *causes* of necrosis are the same as those of osteitis—are external, or internal and constitutional. But either of these may be so energetic as almost immediately to destroy the life of the bone; but more commonly they excite inflammation of the bone, of which the necrosis is a termination or consequence. Mr. STANLEY has shown, that bone may perish from inflammation of it without our being always able to recognise inflammatory symptoms, and yet the existence of inflammation antecedent to the necrosis is undoubted. Owing to the grade, severity, and constitutional relations of the inflammation, or to other causes, the symptoms of osteitis may be so slight as to escape notice. The existence of necrosis is generally more easily detected.

18. Osteitis productive of necrosis may be either mild, slight, or severe and active. The symptoms of osteitis are sometimes so mild as to render the diagnosis difficult. This most commonly occurs in debilitated constitutions, in which the necrosis affects only the external part of a bone, and originates in some chronic and constitutional cause, as scrofula, syphilis, scurvy, &c. But when necrosis supervenes in the substance and the interior of a bone, and occurs in plethoric, irritable, or robust persons, it is both preceded and attended by acute symptoms, by severe pain, much fever, and restlessness; the disease proceeding more rapidly to a termination.

19. *b. Symptoms.*—The swelling accompanying necrosis forms and increases gradually, particularly when caused by osteitis. In the slower and more mild cases, the pain is inconsiderable and dull or aching; but when the swelling increases rapidly, or when the patient is plethoric and irritable, it is more violent. The swelling, as soon as mortification takes place, is much greater than in osteitis; still it is not elevated into an apex, but is so diffused along the bone that its limits cannot be distinguished; and this diffusion of the swelling is the more remarkable the more deeply seated the inflamed and necrosed bone. It may even extend over the whole bone or limb. The swelling commences with the osteitis, and increases until the matter which is formed finds its way out through the soft parts; when the tumefaction partially subsides. When necrosis is advancing, œdema of the soft parts is often present. The abscess attending necrosis proceeds more rapidly the more intense the inflammation, and the nearer the bone is to the surface; but when the necrosed bone is deeply seated, and the inflammation more chronic, the abscess is greater and advances more slowly to the surface; often forming sinuses, particularly if fasciæ intervene. The matter discharged varies in character wtth the constitutional symptoms and origin of the osteitis which has thus terminated. It is sometimes pure pus, but most frequently it is sanious, acrid and fœtid. As the necrosis proceeds the sinuses formed by the outlets of the matter become fistulæ, through which not only the matter, but the remains also of the dead bone make their way.

20. The swelling attending necrosis is always diffused and situated upon a bone, the bone seeming included in the swelling. Even when suppuration has commenced and advanced, it appears deeply seated and obscure. The skin long retains its colour, and does not exhibit a red or livid hue until matter is advancing through the soft parts.

21. *c. The formation of new bone* is a most important part of the phenomena attending necrosis, and much discussion and experimenting have been devoted to the subject by modern surgeons; the

results being nearly as follows: — When the bone dies, consequently either upon osteitis, or upon destruction of the medullary membrane or of the periosteum, the phenomena vary with the part which is first destroyed. If the medullary membrane is destroyed, and the inner layer, or the whole substance of the bone becomes dead, then the periosteum acquires a high degree of vascularity, and becomes thickened, soft, spongy, and loosely adherent to the bone. The cellular tissue also surrounding the periosteum becomes more vascular and infiltrated with lymph. The periosteum thus changed, quitting its hold of the dead bone, is now the formative organ of the new bone; and a reddish fluid mass is secreted by the internal surface of this membrane and is gradually changed into new bone, and thus the same periosteum which had covered the old bone is also the periosteum to the new. If, on the other hand, the periosteum is destroyed together with the bone, whilst the medullary membrane, which performs the office of an internal periosteum, is preserved, this membrane undergoes changes similar to those ascribed to the external periosteum, and is the medium of the formation of the new bone. This latter fact, insisted upon by WIEDMANN and BOYER, has been fully confirmed by the recent experiments of Mr. STANLEY, who states, that "if one side of the walls of a bone be removed without much injury to the medullary texture, the lost bone will be reproduced by the vessels of the medullary membrane." Mr. MAYO also remarks that if one aspect of the cortex of a cylindrical bone is killed by an injury, the cancellous structure granulates, and reproduces what has been lost.

22. Mr. STANLEY has shown that, when necrosis is attended by destruction of the bone and medullary structure, the bone may be regenerated from *three* sources: — 1st. from the articular ends of the original bone, which are seldom implicated: — 2d. from the periosteum which invested the dead bone: — 3d. from the soft parts indifferently, whatever their nature may be, which surround the periosteum, supposing this to be destroyed. Mr. STANLEY removed the periosteum from a dog's tibia, and destroyed the medullary texture, yet reproduction ensued, evidently by the vessels of the surrounding cellular tissue, which had become exceedingly condensed and adhered to the surfaces of the new bone, thus forming its periosteum. This result agrees with the evidence furnished by the experiments of VILLERMÉ, BRESCHET, and DUPUYTREN on the formation of callus. I believe that the surface of bone itself, particularly its divided surface and exposed cancellous structure, will produce granulations or a fluid substance which will be converted into bone, even independently of the surrounding tissue. I once observed in the cranium of a man who had been trepanned many years before for injury of the head, the circular portion of bone removed being unusually large, that the aperture had been *fully filled up with new bone*, and that the ossific matter had evidently been produced from the divided margins of the old bone, as it proceeded from them in striæ, which converged to the centre of what had been the opening, these striæ being larger near the margin of the old bone, and tapering as they converged to the centre of the opening which they had closed. The new formation was dense and without diploe.

23. v. TREATMENT. — The treatment of osteitis and of its consequences necessarily depends chiefly upon the predisposing and exciting causes, and upon the constitution of the patient. The pain and swelling should be combatted by local depletions, and the antiphlogistic regimen; by warm and emollient cataplasms and fomentations; by the frequent application of a small number of leeches to the seat of pain; by alterative aperients and diaphoretics. If *suppuration* take place, an early vent should be given to the matter that is formed. These means should be pursued with an activity commensurate with the severity of the symptoms, and the strength and youth of the patient. If pus accumulate in the medullary canal, it may be necessary to procure it an outlet by perforating the bone. Dr. MACFARLANE trephined the tibia in two cases with success, in order to give vent to the pent-up matter. The diagnosis, however, of such cases is the chief difficulty.

24. If the disease proceed from *syphilis* or *scrofula*, the preparations of *iodine*, especially the iodides of potassium or of mercury, or the bichloride of mercury, with sarsa or the compound tincture of cinchona; or the iodide of potassium with liquor potassæ and sarsaparilla, are the most efficacious constitutional remedies. I have lately prescribed Mr. DONOVAN's solution of the iodides of mercury and arsenic with great benefit in one case of venereal osteitis. If *scurvy* be connected with the appearance of osteitis, the means advised for that disease should be chiefly relied on (see art. SCURVY).

25. If *necrosis* supervene, the indications suggested by WIEDMANN are most appropriate, namely, to remove the original cause of the disease; to alleviate the symptoms; to support the patient's strength and improve the state of the constitution; and, lastly, to remove the dead portions of bone when they become loose. These comprise the same means as have just now been recommended. In order to improve the constitution of the patient, whether syphilitic or scrofulous cachexia be present, the preparations of iodine, or of mercury, or a combination of both; those of sarsaparilla and of cinchona; the chlorides, particularly the chlorate of potash, combined, according to circumstances, with other remedies, should be principally employed, and aided by pure air, and suitable diet and regimen.

II. ORGANIC LESIONS OF BONES, OCCURRING INDEPENDENTLY OF INFLAMMATION.

CLASSIF. — IV. CLASS. IV. ORDER (*Author*).

26. There are various lesions found in bones which are independent of inflammation at their commencement, although limited or slight osteitis may be excited by them in their course, particularly around them, or in their immediate vicinity. These lesions are generally of rare occurrence compared with those which proceed from inflammation.

27. *A.* SOFTENING OF BONES — *Osteomalacia, malacosteon, osteosarcosis, mollities ossium* — is sometimes caused to a slight extent by the long-continued rest of a joint, but commonly by rickets and scrofula. Softening is owing to the disproportion of the phosphate of lime to the amount of animal matter or jelly; the former being generally reduced to one half its usual amount, and the latter increased about one third. Softened bones are more or less flexible, and are usually

bent or misshapen, partly by the action of the muscles, and partly by the weight of the body. Softening of bones occurs in *two forms*: 1st. In connection with rickets and general debility in *childhood*:—2d. In adults and *aged persons*, from constitutional vice or debility.—(*a*) *Rickety bones*, according to the increase of their vessels and the expansion of their cells with jelly, become of a red colour and swollen. This softening is sometimes congenital, but it usually occurs in children; and is rarely so general, and so malignant, as that which affects persons advanced in age.—(*b*) The softening observed in *adults and old persons* is often very remarkable; and even in the slighter cases is very rarely controlled by treatment. It is either partial or general. It is met with chiefly in females, and has been observed consequent upon scurvy, syphilis, mercurial disease, tubercles, scrofula, diabetes, lepra, rheumatism and gout, and the accidents connected with parturition, or the more usual consequences of child-bed, as disordered lochia, &c.

28. *a.* Softening of bones, particularly in adults, is generally attended by pains resembling those of chronic rheumatism, or by aching in the bones affected. Afterwards the bones bend or yield to the action of the muscles, or to the weight of the body; and the pains increase on muscular action. The height, size, and form of the body are diminished, changed, and deformed respectively; and the affection usually continues to advance, with all the indications of general debility, until it terminates fatally. In some cases, the teeth are the only bones which altogether escape change.

29. *b.* The softening of bones in adults differs from the rickets of children. The latter is generally cured by treatment or by the progress of age: but the former is progressive whatever may be the remedies employed. The softening accompanying rickets is not attended by pain; that of adults always is accompanied with pain, although the pain is not constant throughout the disease. The softening in the latter also is usually more general and much more remarkable. These circumstances indicate that they are distinct maladies.

30. *c.* The *treatment* consists in the employment of tonics, with lime-water, and small doses of phosphoric acid, or other preparations of lime and phosphorus. Sea-air and sea-bathing, chalybeate and refreshing mineral waters; exposure to the light and to the sun's rays; nutritious and light diet, a dry and pure air, and sleeping in a large airy apartment, are the most appropriate remedies. (See also art. RICKETS.) These are generally efficacious in softening in children; but their influence upon the softening of bones in adults is very doubtful.

31. *B.* FRAGILITY OF BONES.—*Brittleness.*—*Spontaneous fracture.*—This change is very rarely congenital, and also rarely observed in youth. It usually occurs in advanced age. In it the animal matter is comparatively less abundant than the earthy constituent. The cancerous cachexia is often the cause of this alteration, as shown by HAMILTON, STRACK, LOBSTEIN, and others. Fragility of bones has been observed also consequent upon gout; and in rare instances upon the same maladies as have preceded softening of bones. OTTO states that fragility is not infrequently observed at BRESLAU consecutively upon cancer, syphilis, and scrofula. It is often preceded by pains in the bones. It is rarely amenable to treatment.

32. *C.* EROSION OF BONES generally arises from the pressure of aneurisms or of tumours of any kind. In these cases, the cause is mechanical: the portion of the bone subjected to pressure, having its vitality thereby impaired, is removed by absorption; or the pressure, whilst it obstructs the circulation, favours absorption in the part pressed upon. OTTO and others, however, believe that the pressure excites inflammation in the parts subjected to it; that the inflammation is rapidly followed by ulcerative absorption; and that this change differs from caries only in not being attended by suppuration or discolouration of the eroded part.

33. *D.* SANGUINEOUS TUMOURS are sometimes found in bones, and numerous instances of the occurrence have been recorded by authors.—*a.* Some of these tumours are manifestly *aneurismal*, or owing to a remarkable dilatation of the vessels penetrating the bone. As the small aneurismal tumour enlarges, the surrounding osseous tissue is absorbed, a cavity is formed, the two tables of the bone are thinned, and ultimately perforated. When the tumour becomes considerable it presents the same characters as other aneurisms. The periosteum around the tumour is generally thickened, and the nerves and surrounding tissues pressed upon, stretched, flattened, &c. In some cases, related by DUPUYTREN, BRESCHET, PEARSON, LALLEMAND, SCARPA, and others, the tumours acquired very large dimensions. They generally occur in adults, consequently upon injuries, contusions, &c., and are attended by a pulsating pain. When they are large the superficial veins are distended, and the limb swollen and sometimes discoloured. The pulsations cease upon firm pressure on the artery of which the aneurismal vessel is a branch. The *treatment* of these cases is principally surgical—by ligature of the principal vessel or by amputation of the limb.

34. *b. Sanguineous Tumours* of a doubtful nature are sometimes found in bones. These tumours are described by M. BERARD as differing from the aneurismal and from the fungoid, or hæmato-fungoid, and as consisting of a reticulated structure, resembling that of the cavernous body, containing altered blood and clots of fibrine. These tumours resemble those usually termed aneurism by anastomosis. M. BRESCHET considers them to arise from a peculiar inflammation of the osseous tissue, in which the venous canals of the bone are chiefly affected. They may be also viewed as erectile vascular tumours. Their progress is similar to that of aneurismal tumours, but more slow. They are not amenable to treatment; amputation being the only certain cure.

35. *E.* TUBERCULAR FORMATIONS are occasionally found in bones; and have been very minutely described by MM. DELPECH, NICHET, NÉLATON, and BERARD. They present themselves in two forms, the *encysted* and the *infiltrated*. The *encysted* is found in two states—the *crude* and the *softened*.—*a.* In the former state, tubercles occur in the substance of the bone, the places or cavities they occupy being a loss of the substance of the bone, owing to the absorption of it as they are developed and increased. The cavities

are smooth at first, but become, as they increase, rugous and anfractuous. They ultimately, by their enlargement, open, either into each other, if the tubercles are clustered, or ultimately in the periosteum, or into a joint. The bone is generally slightly injected to the extent of one or two lines around the tubercles. As they open into the periosteum this membrane becomes injected at that part, and deposits a layer of ossific matter, which for a time resists their further progress. These tubercles commence in small greyish, semitransparent granulations, each of which is inclosed in osseous cells with solid partitions; but as they increase the partitions are absorbed, and the matter is contained in a single cavity, and one cyst (Nélaton). They thus resemble tubercles in other organs. As the tubercular mass, thus formed, increases, it becomes *softened* generally from the centre to the circumference, but sometimes at first at its periphery, and it ultimately assumes a pultaceous state, in which it escapes by an opening, or a fistula, in the surface of the bone, and gives rise to an abscess in the soft parts, covering the outlet from the bone. As it is evacuated, the cavity in the bone is obliterated gradually by thickening of the membrane of the cyst, and ultimately a spontaneous cure is thereby effected. The filling up and cicatrisation of tubercular cavities is thus fully established in respect of bones.

36. *b. Tubercular infiltration* of bone has been only recently described by M. Nélaton, who particularises two forms of it, one *semitransparent* and *firm*; the other *opaque* and *puriform*. The infiltrated matter softens gradually and becomes liquid and puriform. At the same time, the osseous cells of the infiltrated part become partly obliterated by thickening of their partitions, and the blood-vessels obstructed by this interstitial hypertrophy, so that the death of the portion of bone thus affected often ultimately follows, the necrosis not being the result of inflammation, as supposed by M. Delpech, but of obliteration of the vessels of the part.

37. *c.* Tubercular disease of the bones is much more common in childhood than at any other age. It may occur in adults, but is the more rarely observed the more advanced the period of life. It affects chiefly the spongy parts, but it may affect any of the bones. It is most commonly observed in the bodies of the vertebræ, in the extremities of the long bones, in the sternum, &c.

38. *d.* The *duration* and progress of the malady varies with the parts affected by it. The *encysted variety* generally advances to the external surface of the bone as it softens, penetrates the periosteum, notwithstanding the defence offered by this membrane to its progress (§ 35), opens into the soft parts, suppurates, and forms a fistula, and the matter, advancing to the surface, is discharged externally. Ultimately the cavity in the bone is obliterated in the manner stated above, if the case proceed favourably. When the tubercular mass forms in the extremity of a long bone, it generally makes its way to the articular surface, in preference to the periosteum. The *infiltrated variety* proceeds more slowly, and generally terminates by caries or necrosis.

39. *e.* The *symptoms* of tubercles of the bones are very obscure in the early stages. As long as the disease is confined to the substance of the bone, slight or occasional pains are only complained of. But when the mass affects the periosteum, and especially if it have penetrated into the soft solids, the abscess that is formed, and subsequently the tubercular character of some of the discharge, will point out the nature of the disease. The changes which afterwards take place vary much; but the state of the bone may be partly ascertained by examination, by the local appearances, and the constitutional symptoms.

40. *f.* The *treatment* is necessarily the same as I have suggested for scrofulous osteitis and scrofulous necrosis (§§ 24, 25). See also the article on Abscess.

41. *F.* Osteosarcoma, or Malignant Tumour of Bones—*Bony Cancer—Osteosteatoma—Fungus ossium—Cancer ossium—Exostosis fungosa—Exostosis carnosa—Ex. carcinomatosa, &c.*,—presents various forms.—*a.* In some cases it approaches the fungo-hæmatoid or encephaloid character; in others it more nearly resembles the scirrhous: in a few it is fleshy, and in many it presents cavities filled with a substance of varied density and colour. In general, however, the tumour at first consists of a somewhat homogeneous, greyish, or greyish white, unvascular mass, intermixed with bony points and fibro-cartilaginous fibres, more or less firmly consolidated with albumen. As the tumour advances, its tissue becomes rarified or loosened, forming cells of various sizes, filled with a light-coloured semi-transparent jelly. Inflammatory action or vascular excitement now often takes place in the tumour, and the cellular tissue lining the cells becomes thickened, and secretes an albuminous substance, which is sometimes soft and brain-like, at other times more consistent, or even hard. In other cases, cellular tissue, loaded with albumen, is formed in it. The blood-vessels gradually enlarge in the periosteum, and in the interior of the tumour, and cavities are formed in the latter, filled with venous blood. Blood is sometimes also effused in the brain-like substance, or is mixed with it. Innumerable bony fibres or plates commonly project from the bone outwards, penetrate the tumour in various directions, and, becoming softer and larger, are finally united with the fleshy and membranous parts lying upon it.

42. These tumours assume various changes and appearances in different cases. If they are formed in the centre of a bone, they distend the layers or plates, and reduce them to a thin shell. In many cases the bone almost disappears, and merely a few irregular osseous spiculæ or plates are formed in the tumour. These tumours may reach a very large size—may even be two feet or two feet and a half in circumference, and ten or twelve pounds in weight. They are generally knobbed or irregular on the surface, and of various degrees of hardness. The bone adjoining the tumour is altered to some extent. The cells are enlarged, red or inflamed; occasionally even carious. New formations of bone are sometimes produced in the vicinity.

43. *b.* Osteosarcoma may affect any bone, but it is observed most frequently in the bones of the face, at the base and arch of the cranium, in the long bones. It is most frequently observed in adults and advanced age, and very rarely in childhood. The precise *tissue* in which the

malady originates has not been fully determined. BOYER supposed that the disease commences in the soft parts, and attacks the bones only secondarily. Others believed that it begins in the bone itself. M. SANSON supposed that it originates either in the medullary membrane, or in that lining the spongy cells,—an opinion which seems to accord with that entertained by SANDIFORT, SIEBOLD WALTHER, EBERMAYER, and OSSIUS. LOBSTEIN, however, considered the medullary membrane not to be its original seat, as the tumour is sometimes found external to this membrane, which has remained sound. It may probably arise either from this tissue, or from the membrane lining the vascular canals and spongy cells.

44. *c. Symptoms.*—This malady is first announced by acute deep-seated pains, which often are long felt before any tumour can be detected. The constitution also frequently betrays disorder before it is observed. As soon as swelling appears, its hard, knobbed, unequal surface, the manner of its involving the whole bone, and its complete immobility, indicate its nature. At a still further advanced stage, the pains become more acute and lancinating, the soft parts are involved in the tumour, and are also painful; the skin sometimes is inflamed and ulcerated, particularly when the disease is very far advanced, and red fleshy or fungous excrescences, which bleed on the slightest contact, spring from the surface. The patient's condition becomes rapidly worse; fever, sleeplessness, and marasmus, characterising the last period of his existence.

45. *d.* The *prognosis* of this malady is most unfavourable; amputation or complete extirpation of the disease, where either can be done, so as completely to remove the affected part, being the only *treatment* which is of any avail.

46. *G.* HYDATIDS are rarely found in bones; but instances of the occurrence have been recorded by VAN DER HAAR, CULLERIER, WEBSTER, WICKHAM, FRICKE, DUPUYTREN, COOPER, KEATE, and others. The hydatidic cyst, containing the small rounded vesicles, &c., presents the same appearances and changes as are described in the article HYDATIDS. It is usually found in the spongy part of the long bones, or in the diploe of the flat bones; but it is also sometimes seen in the diaphysis of the former. In very rare instances the hydatidic mass, after having perforated the bone, if seated near a joint, may penetrate into the articular cavity.

47. *a.* The *progress* of the disease is very slow, being seldom of shorter duration than several years. Having perforated the bone, the hydatidic cyst invades the adjoining soft parts. Ultimately these are destroyed, and it reaches the surface. But in all the cases on record, the tumour formed by it has been opened by the surgeon, before it has perforated the skin. The hydatidic mass, of various bulk, being evacuated, suppuration is established in the cyst, and the *débris* of membranous cysts and dead hydatids, generally mixed with a fœtid pus and sanies, are discharged. When the cyst is inflamed it becomes the seat of an abundant suppuration, which can rarely be arrested without its destruction. When a considerable portion of a long bone is destroyed by the cyst, fracture of it may take place. Cases of this kind are recorded by some of the writers referred to; and is, upon the whole, a less evil than the next to be noticed. If the hydatids are seated near a joint, they may penetrate into it, causing acute inflammation of it at first, that generally passes into a chronic state with structural change of the tissues composing it, and of the heads of the bones.

48. *b.* Hydatids of the bones are *caused* by the influences which produce them in other tissues. The majority of cases on record show, that contusions or other injuries had been received on the part in which the hydatids were seated, or that the venereal disease had preceded their appearance.

49. *c.* The *symptoms* of hydatids in bones are extremely obscure; the first indication furnished by them being a tumour in the part affected, and this rarely appears until they have penetrated the bone. The tumour is attended with little or no pain or tenderness, and no constitutional disturbance, besides that constitutional weakness or deficiency of vital power which favours the developement of parasitic formations. As the tumour increases, it becomes softer and more elastic, similar to lipoma or fungo-hæmatoid tumours. Ultimately it may present more or less fluctuation. It still occasions little or no pain, although it may altogether prevent the use of the limb in which it is seated. The absence of pain, the slow progress of the disease, and the slight affection of the constitution, are the chief means of diagnosis afforded by it. Still, in most of the cases on record, the nature of the malady was not known until the hydatids were evacuated.

50. *d.* The *prognosis* of this malady is always more or less unfavourable. As long as the tumour is unopened, it occasions but little constitutional disturbance; but when it is opened, inflammation takes place, which seriously affects the general health, commonly already impaired, and a prolonged and weakening suppuration is the usual result, which often destroys the patient. The amount of danger, however, depends upon the seat of the hydatids, and the possibility of removing not only them, but the cyst containing them. When they are seated in the bones of an extremity, and are not developed in any other part, surgical interference, aided by tonic or restorative constitutional means, will often prove successful.

51. *e. Treatment.*—The *indications* of cure are—1st. To remove or destroy the hydatidic cyst, or to remove the portion of bone containing it:—2d. To support the constitutional powers and to enable them to throw off or to resist the disease:—and 3d. To subdue accidental changes of an unfavourable or inflammatory nature, whether local or constitutional, as they arise. The fulfilment of these indications is to be accomplished by surgical and medical measures, of so obvious a kind as not to require particular notice.

52. *H.* SPINA VENTOSA.—I agree with M. BERARD in considering this not to be a distinct disease of bones, as generally supposed; but the result of the organic maladies described above, when they are attended by tumour, swelling, or protrusion of the external plate of bone and periosteum, or by that external configuration which has been described as constituting spina ventosa. These changes and appearances are most commonly produced by the malignant, hydatidic, tubercular, and sanguineous tumours, which have been as fully described as my limits will permit.

53. *I.* Foreign Bodies have been found in bones; and these have lodged in them, either from external injury, especially by leaden bullets, small shot, &c., or been conveyed to them through the medium of the circulation, as in cases where mercury, arsenic, or sulphur has been detected in them. Neither of these however require more than a simple notice at this place. It may be remarked, however, that leaden balls may remain a long time in bone without producing much disease; still caries or necrosis may be occasioned by them.

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OVARIA. — DISEASES OF THE. — Syn. *Ovarium, from Ovum, an Egg; Testis Muliebris. Ovaire,* Fr. *Eierstöck,* Germ. *Ovary.*

Classif. — Special Pathology. — Morbid Anatomy.

1. The diseases of the ovaria are extremely numerous; for these organs are liable not only to the disorders and structural lesions to which other organs are subject, but they also occasionally present lesions and displacements which are peculiar to themselves; disorders of formation and of structure connected with the performance of their functions during the epoch of sexual maturity and activity. In the discussion of the pathology of

these organs, I shall consider *first* their functional disorders; *secondly*, inflammation originating in, or extending to them, with its consequences; and, *thirdly*, the lesions of structure presented by them.

I. FUNCTIONAL DISORDERS OF THE OVARIA.

CLASSIF. — I. CLASS. II. ORDER (*Author*).

2. DEFIN. — *The non-performance of those functions which may be referred more especially to the vital energy of the ovaria, owing to the imperfect or impaired state of their energy; — or, inactivity of the ovaria, as evinced by the absence, the defect, or impairment of the functions imputed to these organs.*

3. Several of the disorders which have been treated of under distinct heads may be arranged under this category, as they either originally proceed from, or are more or less intimately associated with, imperfect or prematurely exhausted vital activity of the ovaria; and to this cause they have been assigned when discussing these subjects. Delayed *menstruation*, *chlorosis*, some states of *sterility*, more especially belong to this pathological condition: but these, having been fully considered under their respective heads, hardly require to be noticed in this place. I may, however, remark, that I have had several opportunities of inspecting the bodies of adult females long past the period of puberty, who have been subjects of delayed menstruation and chlorosis, on which tubercular consumption had supervened, and in all these the ovaria and Graaffian vesicles had remained in the undeveloped state of childhood. In one case, the ovaria were not only remarkably small, but their coverings were indurated, thickened, and nearly cartilaginous. (See arts. CHLOROSIS, MENSTRUATION, &c.)

II. INFLAMMATION OF THE OVARIA. — SYN. *Oophoritis* (from ὤον, ovum; φέρω, fero), Hildenbrand. *Ovaritis, Ovarite*, Fr. *Eierstocksentzündung*, Germ.

CLASSIF. — III. CLASS. I. ORDER (*Author*).

4. DEFIN. — *Pain in either or in both sides of the hypogastrium, increased on touch or pressure, occasionally with tumour in these situations, and symptomatic fever generally of an inflammatory character.*

5. It has been asserted by M. DUGÈS and Madame BOIVIN, that a case of inflammation of the ovarium can hardly be adduced, independently of the pregnant and puerperal states. It must be admitted, that cases occurring independently of these states are rare; still they are met with, and I have notes before me now of four cases which occurred in my practice unconnected with these states. Primary and uncomplicated ovaritis is comparatively rare; but ovaritis is more likely to occur in a primary and unassociated form, in females who are neither pregnant nor recently confined, than in those who are thus situated. When it occurs after parturition, it is most frequently complicated with metritis, or with inflammation of the uterine veins.

6. i. CAUSES. — *A*. The *predisposing*, as well as the exciting, causes of ovaritis, have not been sufficiently ascertained, owing to the disease having been very generally overlooked by writers and practitioners, but the following may be considered as the chief; and the authority of HILDENBRAND and others may be adduced in proof of their influence, especially when any of the exciting causes come into operation. Excitement of the imagination by reading voluptuous or immoral works, or romances, or by descriptions of circumstances which affect the desires and emotions, particularly in females unaccustomed, or unable from infirmity of mind, to resist the impulses of feeling and passion; frustrated expectations of marriage with a beloved object; venereal desires often excited without being fully gratified; frequent abortions, and difficult parturition; and sudden continence on the parts of those addicted to sexual indulgences; hence, says HILDENBRAND, prostitutes, when they are imprisoned, and widows, are more frequently than others affected with diseases of the ovaria.

7. *b*. The *exciting causes* are exposure to cold, particularly soon after delivery; injuries received upon or near the hypogastrium; the use of emmenagogues, and of substances to produce abortion; disordered and especially suddenly suppressed menstruation; metastasis of rheumatism; sexual excitement at the period of menstruation; inordinate venereal excitement and masturbation; premature addiction to venereal impulses, or coition too soon after menstruation, or after parturition, or after inflammatory affections of the uterus. WALTHER states that, in his numerous post-mortem examinations he very rarely found the ovaria of prostitutes free from inflammatory and structural lesions.*

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* I have preserved the notes of four cases of *acute uncomplicated ovaritis*, occurring independently of the puerperal states. Besides these, slighter and less clearly defined cases have been seen by me, which have usually been considered as cases of hysteria depending upon vascular excitement or irritation of the ovaria. Of the four cases alluded to, one was *caused* by the sudden suppression of the catamenia, and one from metastasis of rheumatism. The others might be referred to a concurrence of several of the causes assigned above for the disease. The case, arising from metastasis of rheumatism, was remarkable in several respects, especially for the acuteness of the attack. The following is abridged from the original notes: —

Mrs. P——, of —— Street, Walworth, was attacked 15th of July, 1821, with most excruciating rheumatic pains in the loins and limbs, increased on the slightest motion, or on attempts to turn in bed. She was in a profuse perspiration; and her pulse was full, strong, and about 100. She attributed the attack to sleeping in a damp bed when travelling. She was about 26 years of age, strong, plethoric, and of the sanguine temperament. The catamenia were usually very abundant, and seldom at longer intervals than 14 days. Their recurrence was, therefore, soon expected. She had never been pregnant. About three days after the commencement of the rheumatic attack, and whilst I was attending her, she suddenly experienced an attack of most acute pain in the hypogastrium, a little above each groin. Soon afterwards two tumours could be distinctly felt in the regions of the ovaria. They were extremely painful and tender upon pressure. The pains in the limbs were greatly abated, but pain was still complained of in the loins. All the inflammatory symptoms continued. The bowels were costive, the urine scanty and high-coloured, with frequent calls to micturition. The countenance was flushed, animated, and excited; the temper variable and hysterical. The treatment consisted of one bleeding from the arm; of repeated doses of calomel, ipecacuanha, and opium combined, saline aperients being interposed, so as to keep the bowels freely open; of the application of a considerable number of leeches below each groin; and of the warm hip-bath. Four or five days after this attack commenced, the catamenia came on, and the pain, tenderness, and swelling gradually disappeared from the hypogastrium. This lady, the wife of an old acquaintance, was, some years afterwards, the subject of abscess between the vagina and rectum, which opened into the latter. She subsequently was attacked by gout; and ultimately became consumptive, from an excessive addiction to brandy; but was carried off by delirium tremens before the pulmonary disease had reached its utmost limits.

8. Ovaritis is often observed after delivery, but it is then rarely unconnected with metritis or metro-peritonitis, or with inflammation of the uterine and ovarian veins, or of the Fallopian tubes and connecting cellular tissue; but the associations of ovaritis, in the puerperal states, vary much with the prevailing epidemic, with the predisposing and exciting causes, and with the different circumstances in which the disease presents itself. These complicated forms of ovaritis are often observed in lying-in hospitals, in close ill-ventilated apartments, and in low crowded localities; and occur most frequently after difficult parturitions, after floodings, and upon the sudden disappearance or suppression of the lochia or milk.

9. ii. SYMPTOMS.—*A.* The *mild* and more *chronic* states of ovaritis, whether in the unimpregnated or puerperal states, is generally an insidious, latent, and deceptive disease, unless the nature of the case be strictly investigated. Indeed, in many instances, the complaint is not brought before the physician until it has gone on to structural change, or it is confounded with hysteria, from the circumstance of hysterical symptoms being its common attendant. In these cases, a careful examination will generally detect tenderness upon firm pressure, and sometimes even slight fulness or tumour, of either or both sides of the hypogastrium, a little above the groins, with slight febrile excitement; a variable, but usually a more frequent, pulse than in health, variability and excitement of the desires, emotions, and disposition, associated with many hysterical and nervous phenomena; irregularity or suppression of the catamenia; and costiveness, with scanty or varying conditions of the urine.

10. *B.* The more *acute* form of ovaritis is attended by nearly the same symptoms as the above, but more decidedly or acutely marked. The pain, tenderness, and swelling in the hypogastrium are more fully pronounced, the mind more evidently affected, and in the sanguine, the irritable, and plethoric, the desires inordinately excited, so as to amount almost to utero-mania. In some cases, numbness of one or both thighs is felt, particularly on that side where the fulness in the hypogastrium is most evident. Symptomatic fever and hysterical symptoms are sometimes also very prominent. The bowels are constipated, the urine scanty, and sometimes retained, occasionally it is voided in large quantity.

11. *C.* In the *puerperal state*, the symptoms vary remarkably with the prevailing epidemic and the causes and complications of the malady; and is often attended by general asthenia, by contamination of the circulating fluids, and by depression of the vital powers. But the occurrence of the disease in these circumstances, and thus associated, is fully considered in the article on PUERPERAL DISEASES.

12. iii. TERMINATIONS AND CONSEQUENCES.—*A. Resolution* is the most frequent issue of inflammation of the ovaries when the disease occurs independently of the puerperal states; and is indicated by subsidence of the pain and swelling; by the accession of the catamenia; or by a more abundant flow of the lochia when this discharge had been diminished or suppressed in the puerperal state of the disease. (See PUERPERAL DISEASES.)

13. *B. Softening and friability* are generally present in a greater or less degree when ovaritis is very acute and the swelling considerable. In this state, the organ is generally three or four times its natural size, or even larger. In addition to these changes it is infiltrated with a yellowish serum, or with a violet-coloured fluid, and occasionally it presents numerous small ecchymoses or bloody points.

14. *C. Suppuration* may occur in the puerperal, and in the non-puerperal states of the malady, but most frequently in the former. HILDENBRAND met with a case in the latter state, which opened externally and terminated favourably. Ovaritis is very commonly followed by suppuration in an advanced stage, when softening of the organ is very considerable, a puriform matter or serum, infiltrating the substance of the ovarium, partially breaking down portions of it, and forming either one large or more small abscesses. This result is often observed in the puerperal states, but the disease is then usually associated with metritis, or metro-peritonitis, and the case terminates fatally, from other changes in the pelvic and abdominal viscera and circulating fluids, before any large abscess is formed or breaks into adjoining parts. But in cases occurring independently of parturition, a considerable abscess is sometimes formed, which may open into the peritoneal cavity or into the rectum or some other adjoining viscus.

15. *D. Effusions* of a *puriform lymph or serum*, or of a *gelatinous lymph*, are sometimes observed upon the peritoneal surface of the inflamed ovaria and Fallopian tubes, the latter effusion often gluing their surfaces to adjoining parts. It is not improbable that, in the slighter and more chronic cases of ovaritis, a similar effusion of coagulable lymph takes place gradually into the structure of the organ, and occasions the enlargement, with various grades of *induration* observed in a few instances. In these latter cases, the enlargement of the organ is somewhat greater than that observed in acute ovaritis, amounting commonly to the size of an orange. It often remains stationary for a very considerable time, and affects but little the general health.

16. Whether or not the *Graafian vesicles* are ever affected by inflammation, excepting in common with the substance of the ovarium, it is difficult to determine. Purulent matter has been met with in cysts after ovaritis of a sub-acute or chronic character, but it has not been proved whether this arises from inflammation and suppuration of the vesicles, or is circumscribed abscess in the cellular tissue. Dr. SEYMOUR remarks that it would be still more difficult to say what is or would be the effect of inflammation of the *corpora lutea*,—that is, of vascular excitement greater than what is necessary for their formation; for their formation may be said to be owing to increased action of the vessels of the part. Corpora lutea form, in some cases, after rupture of the vesicle, independently of impregnation, owing to excited feelings connected with the generative system; and hence it is reasonable to expect that any morbid affection of the ovaria dependent upon such excited feelings would have their origin in the corpora lutea. In the cases on record, in which the ovaria were altered in structure, in conjunction with furor uterinus, no further information is generally given, than that puriform matter was found in the ovaria. The coats of the vesicle,

Dr. SEYMOUR remarks, undergo in advanced life remarkable thickening; "and, instead of containing fluid, are filled with a thick matter of a red colour, from the presence of vessels, sometimes nearly solid, at others of a thinner consistence. This change exhibits on a small scale some of those hard tumours which are sometimes found in the parietes of an ovarian cyst. Is it not possible that these may be some of the superficial vesicles, having undergone the change alluded to, and magnified by disease?" The fluid contained in the Graafian vesicle is sometimes altered; it being red, or even black from the admixture of blood.

17. iv. TREATMENT.—The treatment of ovaritis should depend entirely upon the causes, the circumstances in which the complaint occurs, and the constitution of the patient. The means most beneficial when the disease is unconnected with parturition are generally either inappropriate or unavailing when it occurs at this period. The treatment of puerperal ovaritis is, therefore, comprised in the article on PUERPERAL DISEASES.

18. *A.* The *slighter* states of the complaint require chiefly local depletions, as the application of leeches to the thighs a little below the groins, cooling aperients, and diaphoretics, with a mild unexciting diet and regimen. In the more *acute* cases, general bloodletting or cupping in the loins or sacrum, antimonial diaphoretics with nitre, small doses of camphor with nitre, the tepid bath, when much tension of the hypogastrium is complained of, and low diet, with perfect quietude, and the avoidance of mental and sexual excitements.

19. *B.* Where the *slighter states* of ovaritis occur in persons of the scrofulous diathesis, they generally become chronic, particularly in those who present indications of their having experienced scrofulous affections of glandular parts, and are commonly attended by severe pains, and much swelling or enlargement remains after the treatment now recommended. In these cases, abscess not unfrequently is formed, and all the symptoms are aggravated until it makes its way either into the rectum or vagina, the most favourable course it can take. If it burst into the peritoneal cavity fatal peritonitis is usually the result. In this form of the disease, small doses of the hydriodate of potash, with liquor potassæ, conium, and sarsaparilla; and injections, per vaginam, of emollient and anodyne fluids, or opiate suppositories, are chiefly indicated. I have prescribed suppositories consisting of the extracts of hyoscyamus and conium, and vaginal injections containing the same medicines with very marked relief. Dr. SEYMOUR praises the extract of colchicum, given in the dose of a grain, twice or thrice daily.

20. *C.* When *abscess* forms in consequence of either acute or chronic ovaritis, and makes its way into the rectum, or vagina, or bladder, or even externally,—this latter being the most rare course it takes,—the strength of the patient ought to be supported, particularly in the scrofulous diathesis, by the preparations of cinchona, by suitable diet, pure air, and residence near the sea-side. Attention should be paid to the digestive functions, and moral and physical quietude should be recommended. The alkaline and chalybeate mineral waters may be subsequently tried.

III. ORGANIC LESIONS OF THE OVARIUM, APPARENTLY INDEPENDENT OF INFLAMMATION.

CLASSIF. — IV. CLASS. I. ORDER (*Author*).

21. i. CYSTS, of various sizes, having their origin in some part of the ovarium, are the most frequent lesions to which this organ is liable. When one or more of these cysts contain fluid, the term *encysted* or *ovarian dropsy* has been given to the disease, although the serous cysts are sometimes formed in the broad ligaments and Fallopian tubes. These cysts are to be distinguished from hydatids, by their being nourished by vessels supplied to them from the parts in which they are found; whilst hydatids are parasitic formations, having an independent vitality, and are unconnected with the cyst containing them. One, or both ovaria, may be changed into simple cysts; and when the cysts are either numerous or large, the cellular substance and vesicles disappear, the fibrous coat of the organ becoming the fibrous covering of the cyst.

22. Dr. SEYMOUR and M. CRUVEILHIER agree in considering this disease to originate in alteration or enlargement of one or more of the Graafian vesicles. When the enlargement takes place to a great degree, it is usually on the side nearest the proper coat, which often becomes distended to an enormous extent; the internal membrane of the cyst secreting a great quantity of fluid. When the cyst is single, the ovarian dropsy exists in its simplest state, and often in its greatest degree. When one, two, or more of the Graafian vesicles undergo the change, the disease consists of an equal number of cysts filled with fluid. The quantity of fluid furnished by this disease is sometimes very remarkable. In a case under the care of my friend Mr. WORTHINGTON of Lowestoft, the quantity of fluid taken away by him amounted nearly to as much as in the case detailed by Mr. MARTINEAU, in which 6,631 pints were lost by tapping in 25 years.

23. The *symptoms* attendant on these tumours are not severe, and are occasioned chiefly by pressure on adjoining parts. When the tumour is seated low in the abdomen, pressure on the nerves and veins often occasions swelling and numbness of the leg and foot on the side where it is largest; but it may continue stationary for many years, or even for the greater part of a long life. In some cases the discharge of urine is more or less affected. The history of the case generally assists the diagnosis of this disease; but I must refer the reader to the article *Dropsy of the Ovarium*, for a full account of its symptoms, history, diagnosis, and treatment. (See art. DROPSY, §§ 198—213.)

24. ii. *Cysts* containing *fatty matter*, intermixed with *hair* and *teeth*, have been met with, either in the substance of one of the ovaria, or adhering to it by a narrow neck, and generally before the period of puberty; consequently they do not arise from impregnation. Similar cysts have been found in other parts of the body, in different individuals. They may be viewed as a species of monstrosity, termed by OLLIVIER and BRESCHET, "*Diplogénésis par pénétration*,"—as the result of an imperfect conception in the mother of the individuals in whom they are found. The *hair* found in these cysts varies in quantity and appearance. It may be isolated, or mixed with fatty

matter, or short or long, with or without bulbs. *Teeth* have usually been found implanted in fragments of bony or cartilaginous substance, or even of a part or the whole of a jaw.

25. iii. *Congestion* and *extravasation* of blood in the ovaria have not been satisfactorily observed. The former may possibly be of not unfrequent occurrence, either in connection with inflammation, or independently of it; and the latter has very rarely been seen to any great amount, unless in connection with ovarian fœtation.

26. iv. *Fibrous bodies*, resembling those found in the uterus, are occasionally found in the ovaria. They vary in size from a few ounces to 30 or 40 lbs. M. Cruveilhier met with a tumour of this kind which weighed 46 lbs. They can hardly be distinguished from similar tumours connected with the uterus. Indeed, they have been formed in one or both ovaria, and in the uterus also of the same subject.

27. v. *Cartilaginous*, *osseous*, and even *calcareous formations* are not unfrequently found in the ovaria. Meckel considered them to originate in the Graafian vesicles. *Fibro-cartilaginous* transformations, with or without ossific deposits, are often met with in aged females. I have seen this change in a chlorotic female twenty-three years of age, who died of consumption, and had never menstruated, but without any ossific deposit. Calcareous deposits are more rare; but have been noticed by Morgagni, Saviard, Petermann, Murat, and others.

28. vi. *Hydatids* are very rarely seen in the ovaria. Instances, however, of the occurrence have been adduced by Cruveilhier, Roux, and Deneux.

29. vii. *Tubercles* are also very rarely formed in the ovaria; but they have been found in this situation by Dugès, Boivin, Seymour, Tonnelé, and Dugast.

30. viii. *Scirrhus of the ovarium* is not often observed. The organ is increased in size — sometimes remarkably; and the tumour is composed of a very solid substance intersected by fibrous membranes, running in various directions. Occasionally portions of the tumour contain cysts filled with secretions of various consistence. These scirrhous tumours very rarely ulcerate. In a case referred to by Dr. Seymour, the scirrhous mass was breaking down into a thick, brown, fœtid fluid. This lesion is occasionally found in females who had scirrhus or open cancer in the uterus or some other part; and is attended by weight and pain in the seat of tumour, which is hard and moveable; and by signs of general cachexia.

31. ix. *Fungoid, and other malignant, tumours* are occasionally found in the ovaria. Some of these consist of a large cyst springing from the ovarium and containing within it tumours varying from the size of a pin's head to that of an orange. Sometimes a great portion of the parietes of the cyst is formed of tumours growing between the external and internal or secreting coat, the interior of the cyst having the tumours projecting into it, being filled with fluid secreted from the serous lining. The tumours, when divided, present a semi-fluid gelatinous substance, with white bands running through it, between which bands are smaller cysts, containing the same viscid, gluelike matter (Seymour).

32. x. *Encephaloid or fungo-hæmatoid* tumours of very large size are formed in some cases in the ovaria. M. Velpeau supposes them to be less rare than other malignant diseases of the ovarium. The encephaloid, or fungo-hæmatoid formation may exist in the same ovarium, or tumour, with the scirrhous structures, described above (§§), or with cartilaginous, fibrous, or fibro-osseous formations, as noticed by Meckel, Andral, and Velpeau; but it may compose nearly the whole mass. The walls of the cysts in this disease are thick, and their cavities gradually enlarge until a tumour is formed which fills not only the hypogastrium, but the whole abdominal cavity. The outer surface of the tumour is unequal; in some points a fluctuation can be felt, while in others it has a hardness equal to bone.

33. This fatal malady occurs usually in younger subjects than those in whom the scirrhous and fungoid tumours already noticed (§§ 30, 31) are usually found. Dr. R. Lee remarks that it sometimes seems to be excited by impregnation. It runs its course with great rapidity; and the constitution of the patient is sooner affected by it, than by other diseases of the ovarium. It generally also coexists with cancerous or fungo-hæmatoid disease in other parts, as the pylorus, uterus, mamma, &c. It may be recognised by the unevenness, rapid growth, and hardness of portions of the tumour; by the occurrence of acute lancinating pains in it; by the simultaneous affection of other parts; by the general cachexia and rapid emaciation; by signs of anæmia; and by the very rapid, small, and feeble pulse, hectic fever, remarkable sense of sinking, and aphthous state of the mouth.

34. xi. *Melanosis* is very rarely observed in the ovaria. When it has occurred, it seems to have commenced, or been seated in the Graafian vesicles.

35. xii. *Encysted tumours* of the ovarium, as well as *malignant tumours*, have been supposed by Dr. Baron to arise from vesicles, formed by a change in the lymphatics of the part; the extremity of a lymphatic being closed, and thus forming, when distended with fluid, a pyriform vesicle. Dr. Baron has shown the important fact, that the diseases which are produced from these vesicles, as tubercles, encysted tumours, cancer, &c., may be artificially excited by bad food, impure air, insufficient nourishment, and confinement. Dr. Hodgkin supposes, that, in the formation of these tumours, a large cyst, which he calls the superior cyst, is first developed, from the inside of which tumours grow, of different sizes and shapes, pushing up the internal membrane of the superior cyst, which is reflected over them, as the pericardium and pleura are in the natural cavities of the body. These secondary cysts contain smaller. Sometimes the smaller cysts grow so fast as to strangulate one another, and the death of some of them causes altered appearances in the secretions of the part. Occasionally they burst through the reflected membrane, and present a fungoid and fringed appearance.

36. xiii. *Fœtuses* are occasionally developed in the ovarium, when some obstacle has occurred to the escape of the impregnated vesicle. Several cases of this occurrence are on record: one of the most interesting of these has been observed by Dr. Granville, and published in the Philosophical Transactions.

37. xiv. THE TREATMENT of the foregoing organic diseases of the ovarium, even when their precise nature is recognised, is frequently attended by little permanent advantage, beyond alleviating urgent symptoms and supporting the vital energies, and thereby resisting, for a longer period than might otherwise elapse, the fatal progress of the malady. Various alteratives have been advised for the removal of the tumours detected in this organ, such as the preparations of iodine, of mercury, liquor potassæ, conium, muriate of lime, &c.; and, when they are prescribed judiciously and cautiously, they are sometimes beneficial when the tumours are not malignant. Of these the most deserving of notice are the preparations of *iodine* and *liquor potassæ*. Of these preparations, the *iodide of potassium* alone, or with the liquor potassæ, *conium*, or *sarza*, or with all of these, and the *iodide of iron*, have appeared to me the most beneficial. I have employed them since their first introduction into practice; but always in smaller doses than were or are usually exhibited; and generally in combination with vegetable tonics or alteratives. In malignant tumours, however, of the ovarium little or no benefit will be derived even from them, beyond the support they may afford to the constitutional powers. The iodide of potassium, however, when conjoined with full doses of liquor potassæ, conium, or other narcotics and anodynes, not merely accomplishes this intention to a certain extent, but also affords considerable alleviation of the more painful or urgent symptoms.

38. Dr. SEYMOUR states that the *liquor potassæ* given in as large doses as the stomach will bear, has appeared to produce in diseases of a malignant nature, more alleviation than any other remedy; particularly in those tumours that are not attended by acute pain, or any considerable symptomatic fever.—Next to the liquor potassæ Dr. SEYMOUR ranks the *muriate of lime* in the treatment of the non-malignant tumours of the ovaria. It has received from Dr. JAMES HAMILTON much praise in the treatment of encysted dropsy of these organs, but it is of doubtful efficacy in other organic lesions; unless such as are of a scrofulous nature, and these are not frequently observed in the ovaria.

39. *Conium* formerly obtained some reputation in scrofulous and malignant tumours, and has been frequently employed in cases of organic disease of the ovaria; but I doubt its possession of any efficacy beyond that which may be derived from its narcotic and anodyne properties. When medicines possessed of these properties are required, the preparations of *opium* or morphia, of *belladonna*, or even of *aconite*, may be brought in aid of other means, or may be conjoined with the preparations of iodine, of iron, of camphor, &c., according to the circumstances of individual cases. In the malignant diseases of the organ they are often of service as palliatives, and are advantageously conjoined with these or with the liquor potassæ or the bromide of potassium. This last substance, however, is more likely to be of service in the non-malignant tumours of the ovarium, in which, however, it has not received sufficient trial.

40. *Of extirpation of the diseased ovarium* some notice has been taken when discussing the *treatment of dropsy of the ovarium* (see art. DROPSY (§ 208. *et seq.*); and I have little to add to what I then remarked. Since that was written, however, this operation has been performed successfully by several surgeons; and in three cases, by Mr. WALNE; the great majority of cases being those of dropsy of this organ. Whilst this success places the operation in a more favourable light than that in which it was formerly held, still the great dangers and contingencies connected with it, which I have noticed in the article referred to, should not be overlooked; nor should it be attempted without due discrimination of the nature and morbid relations and connections of the disease.

III. DISPLACEMENT AND HERNIA OF THE OVARIUM.

41. i. One ovarium, very rarely both ovaria, may be *displaced*, either independently of, or consequently upon, organic lesions of it. The displacement may also be connected with adhesions of the ovarium to adjoining parts, or it may be without adhesion. When thus displaced, the ovarium may be useless in respect of its generative function, sterility being the result.

42. ii. Displacement of the ovarium is not infrequently met with to the extent of constituting a *hernia* of it. The ovarium may protrude through — 1st. The *inguinal ring*, the most common form of ovarian hernia; — 2d. The *crural canal*; — 3d. The *ischiatic foramen*; — 4th. The *umbilical ring*; — 5th. any accidental opening in the *abdominal parietes*; — and 6th. into the *vagina*. Hernia of the ovarium is very rarely met with in any of these situations, excepting the first. The hernia may be *reducible*, or *irreducible*, *simple*, or *complicated* with organic lesion of the organ, or with adhesion of it to adjoining parts; and it may be *strangulated*. But these displacements, and more particularly the treatment of them, concern the surgeon more than the physician.

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OZÆNA (from ὄζω, I smell.) — SYNON. — *Ozene*, Fr. *Stinkende Nasengeschwür*, Germ.

CLASSIF. — IV. CLASS. II. ORDER (*Author.*)

DEFIN. — *A discharge of a fœtid, puriform, or sanious matter from the nostrils.*

1. *a.* This disease is generally *symptomatic* of ulceration of the membrane lining the nostrils, the palate, maxillary and frontal sinuses, &c., or of

caries of the bones in these situations, and always attends *syphilitic disease* of these parts. It may accompany also *scorbutic*, *scrofulous*, and *cancerous affections*, either in these situations, or in the vicinity. A slighter form of it sometimes follows *chronic coryza*, particularly in scrofulous constitutions, in the cachectic, and in those of a lax and leucophlegmatic temperament. In some cases, the matter secreted is scanty, but it is often attended by the discharge of fœtid crusts. This state, as well as other states, of ozæna may follow or attend *malignant scarlet fever*, and *erysipelas* of the face. In a case lately treated by Sir B. BRODIE and myself, the ozæna, with consistent crusts, was occasioned by an injury of the nose received when hunting; and was followed by erysipelas of the face and head; the ozæna, however, continuing, in a slighter form, after the erysipelas was cured.

2. *b.* The *progress* of the disease is generally slow; and it is rarely attended by acute pain, unless when caused by cancer. Hence it is often neglected until the bones are affected, when it proceeds from chronic inflammation and ulceration of the membrane. In some cases, however, an aching is complained of.

3. *c.* The *prognosis* should depend upon the nature of the pathological causes of ozæna, or of the disease of which it is a symptom. If there is reason to infer the existence of caries of the bones of the parts above named, the prognosis should be either unfavourable or guarded.

4. *d.* The *treatment* ought likewise to depend upon the origin, or cause of the discharge; but in all circumstances it ought to be both *constitutional* and *local*. — (*a.*) The *former* should consist of tonics, conjoined with alteratives, as the liquor potassæ with the preparations of sarza, and in some cases also with the iodide of potassium; or the preparations of bark, either with alkalies, or with the hydrochloric or nitric acids, or with both these acids. A dry pure air, or residence near the sea-side, and light nutritious diet, are generally also beneficial. If the ozæna proceed from *syphilis* or *scurvy*, the treatment suitable to those maladies should be prescribed.

5. (*b.*) The *local* measures consist chiefly of weak injections of the chlorides, particularly of the chloride of lime, or of the chloride of potash, or the passage of a stream of tar-water, or of fluid containing either creasote, or a small quantity of the sulphate of zinc, or of nitrate of silver, or of alum, through the fauces and nostrils. The local as well as the constitutional treatment, however, should be guided by a careful inspection of the parts, and by a correct estimate of the existing extent of mischief, as well as of the exciting and concurring causes. In some obstinate cases, the ozæna have been cured by a seton in the nape of the neck.

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END OF THE SECOND VOLUME.

London:
Printed by A. Spottiswoode,
New-Street-Square.

17932